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TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1928 1930

No. 501 3

POWERS-KENNEDY CONTRACTING CORPORATION AND ANTHONY G. FLECK, PETITIONERS,

vs.

CONCRETE MIXING AND CONVEYING COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT

PETITION FOR CERTIORARI FILED OCTOBER 15, 1928

CERTIORARI GRANTED DECEMBER 10, 1928

(33,810)

(33,810)

SUPREME COURT OF THE UNITED STATES

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[fol. 1]

IN UNITED STATES DISTRICT COURT, SOUTHERN DISTRICT OF NEW YORK

In Equity

CONCRETE MIXING AND CONVEYING COMPANY, Plaintiff,

vs.

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, Defendants

BILL OF COMPLAINT

Plaintiff, for complaint against defendant, alleges as follows:

(1) Plaintiff, Concrete Mixing and Conveying Company, is a corporation organized and existing under and by virtue of the laws of the State of Illinois, having its principal place of business at Chicago, in the County of Cook and State of Illinois. Defendant, Powers-Kennedy Contracting Corporation, is a corporation organized and existing under and by virtue of the laws of the State of New York, having its principal place of business at 149 Broadway, New York City, in the State of New York, and defendant, Anthony G. Fleck, is a citizen of the State of New York and has a regular and established place of business in the Borough of Manhattan, within the Southern District of New York, [fol. 2] within which district both defendants have committed acts of infringement of plaintiff's patent, of which complaint is made herein.

(2) John H. McMichael being, prior to January 14, 1907, the original, first and sole inventor of certain new and useful improvements in method of and apparatus for transporting and treating concrete, lawfully filed and prosecuted an application for United States Letters Patent therefor, and having complied in all respects with the statutes, United States Patent No. 1, 127,660 was lawfully granted and issued pursuant to said application to the plaintiff on February 9, 1915.

Said invention was new and useful, not known or used by others in this country before his invention thereof, not patented or described in any printed publication anywhere before his invention or more than two years prior to said application for United States Patent therefor, not in public use or on sale in the United States for more than two years prior to said application for United States Letters Patent therefor, not patented in any foreign country by him or his legal representatives on an application filed more than one year before his said application for United States Letters Patent, and not abandoned. Said United States Letters Patent No. 1,127,660 is now in full force and is hereby proffered and ready to be produced before the Court.

(3) The invention patented in the aforesaid patent No. 1,127,660 is of great utility and has been introduced into public use by the plaintiff, and the public generally has [fol. 3] acquiesced in and acknowledged the utility of said invention, and the validity of said Letters Patent, and the plaintiff's exclusive rights thereunder.

(4) Plaintiff is and always has been the sole owner of said United States Letters Patent No. 1,127,660 and of all rights of action for infringement thereof.

(5) In violation of plaintiff's rights under said United States Letters Patent No. 1,127,660, and without any authority, since the issuance of said patent and within six years prior to the commencement of this suit within the Southern District of New York, and elsewhere in the United States, defendants have jointly and severally infringed plaintiff's exclusive rights granted by said patent by making and (or) using and (or) selling the patented apparatus for transporting and treating concrete, an instance thereof being in the construction of the Queensborough subway extension, in the Borough of Manhattan, City of New York, State of New York, the said infringing machines having been made and (or) caused to be made and (or) used by the defendant Fleck on the said work for the defendant corporation and the said two defendants having conspired together and co-operated in the committing of said infringement. Defendants continue to make and (or) use and (or) sell the apparatus embodying the patented invention in violation of plaintiff's rights, and in infringement of said

patent, whereby plaintiff has been and is greatly and irreparably damaged, and whereby defendants have obtained [fol. 4] and are obtaining large profits which in equity belong to the plaintiff, the amount of which damages and profits the plaintiff cannot ascertain except by an accounting.

Plaintiff therefore prays:

(a) That defendants be required to answer this bill of complaint, but not under oath, answer under oath being hereby expressly waived.

(b) That the court grant a preliminary injunction pending this suit and a perpetual injunction restraining defendants, its officers, and their joint and several agents, employes and confederates from making, using or vending devices embodying said patented invention, and from offering or advertising so to do, and from aiding or abetting or in any way contributing to the infringement of said patent.

(c) That this cause be referred to a Master to make and report on account of damages and profits accruing from defendants' infringement of said patent, and that the damages reported be increased threefold in view of the wanton character of defendants' infringement, and that plaintiff have judgment for the damages and profits so found and for the costs of this suit.

(d) That plaintiff have such other and further relief as equity may require.

Concrete Mixing and Conveying Company. (Signed)
Edward Wray, President.

[fol. 5] In United States District Court

Answer

Answering the complaint herein, the defendants, the Powers-Kennedy Contracting Corporation, and Anthony G. Fleck, severally and jointly say:

A. They have no knowledge or belief that the plaintiff is a corporation as alleged in paragraph 1 of the complaint, or that it is the sole owner of the McMichael patent No.

1,127,660 or of any or all rights of action for infringement thereof as alleged in paragraph 4 of the complaint.

B. They admit the allegations in the second sentence of paragraph 1 of the complaint except that they deny they have committed any acts of infringement of said patent.

C. They admit that patent No. 1,127,660 was granted on February 9th, 1915, and that John H. McMichael on January 14, 1907, filed an application for a patent, but they deny that said patent was issued lawfully pursuant to said application, or that said McMichael was prior to January 14, 1907, the original, first and sole inventor of any new or useful improvement set forth in said application, or that he had then or during its prosecution did comply in all respects with the Statutes.

D. On information and belief, they deny, save as aforesaid, each allegation in paragraph 3 and in the second section of paragraph 2; and allege specifically that said inven- [fol. 6] tion was not new and not useful, that it was known or used by others in this country before John H. McMichael's alleged invention thereof, that it was patented or described in printed publications before his alleged invention and more than two years prior to his said application for United States Patent therefor, that it was in public use or on sale in the United States for more than two years prior to his said application for United States Letters Patent therefor, that it was patented in a foreign country by him or his legal representatives on an application filed more than one year before his said application for United States Letters Patent, that it was abandoned; that said United States Letters Patent No. 1,127,660 is not now in full force; that the alleged invention patented in the aforesaid patent No. 1,127,660 is of no utility and has not been introduced into public use by the plaintiff, and that the public generally have not acquiesced in or acknowledged the utility of said invention, or in the validity of said Letters Patent, or in the plaintiff's alleged exclusive rights thereunder.

E. They deny each allegation in paragraph 3 of the complaint and deny specifically that in violation of plaintiff's rights under said United States Letters Patent No. 1,127,660, and without any authority, since the issuance of said patent and within six years prior to the commencement of

this suit within the Southern District of New York, and elsewhere in the United States, (they) defendants have jointly and severally infringed plaintiff's exclusive rights granted by said patent by making and (or) using and (or) [fol. 7] selling the patented apparatus for transporting and treating concrete; and they expressly deny that they have, are, or intend to commit any act of infringement in the construction of the Queensborough subway extension in the City of New York, Borough of Manhattan, and State of New York; and they deny that the said infringing machines having ben made and (or) caused to be made and (or) used by the defendant Fleck on the said work for the defendant corporation and the said two defendants having conspired together and co-operated in the committing of the said infringement; and they deny that they continue to make and (or) use and (or) sell the apparatus embodying the patented invention in violation of plaintiff's rights, and in infringement of said patent, and deny that plaintiff has been and is being greatly and irreparably damaged, and deny that defendants have obtained and are obtaining large profits which in equity belong to plaintiff.

F. On information and belief, they allege that all such apparatus as they may have made, used or sold, either jointly or severally, is beyond any reasonable interpretation of said patent, and that said apparatus, except wherein it represents the conventional skill of the art prior to the alleged McMichael invention, is altogether different in structure and function from anything covered by said patent.

G. On information and belief, they allege that the apparatus set forth in said patent involved nothing more than the exercise of the expected skill of the art prior to the Mc- [fol. 8] Michael alleged invention; and they allege that said patent is invalid and anticipated fully by prior patents and publications as follows:

Inventor	Number	Date
S. W. Wood	65,149	May 28, 1867
L. La Rue Smith	268,305	Nov. 28, 1882
J. W. Beach	267,318	Nov. 14, 1882
J. B. Hyde	274,778	Mar. 27, 1883
L. Smith	279,034	June 5, 1883

Inventor	Number	Date
J. Lewis	285,047	Sept. 18, 1883
J. G. Pohle	347,196	Aug. 10, 1886
J. S. Wallace	408,201	Jul. 30, 1889
M. B. Church	487,606	Dec. 6, 1892
G. G. and H. N. Gray	477,361	June 21, 1892
A. Bryce	520,766	June 5, 1894
J. E. Mathewson	531,379	Dec. 25, 1894
A. Bryce	561,482	June 2, 1896
S. C. Davidson	599,055	Feb. 15, 1898
C. T. Hennig	609,744	Aug. 23, 1898
E. A. Franklin	634,524	Oct. 10, 1899
H. G. Warren	671,303	Apr. 2, 1901
W. Goldie	676,128	June 11, 1901
J. C. Hooper	704,037	Jul. 8, 1902
W. Goldie	707,840	Aug. 26, 1902
L. H. Davis	730,884	June 16, 1903
H. Cutting	773,852	Nov. 1, 1904
M. A. DeFrance	741,116	Oct. 13, 1903
N. Farnham	747,396	Dec. 22, 1903
G. M. Schwend	752,598	Feb. 16, 1904
F. Sticker	758,118	Apr. 26, 1904
G. Rosenthal	759,750	May 10, 1904
J. D. Murray	783,218	Feb. 21, 1905
J. D. Murray	773,665	Nov. 1, 1904
F. W. Breidster	791,176	May 30, 1905
[fol. 9] H. H. Hahn	808,236	Dec. 26, 1905
A. Q. Nash	830,518	Sept. 11, 1906
W. H. Kelly	839,483	Dec. 25, 1906
E. Phillips	837,113	Nov. 27, 1906
J. D. James	837,622	Dec. 4, 1906
F. M. Wise	847,270	Mar. 12, 1907
W. H. Kelly	864,471	Aug. 27, 1907
W. L. Canniff	873,345	Dec. 10, 1907
J. W. Buzzell & Larkin	894,813	Aug. 4, 1908
W. McIlvrid	958,421	May 17, 1910
F. S. Lamson	1,249,290	Dec. 4, 1917
Gauthir	386,121	
Prindle	179,055	
	23,594	(British) 1896
	12,758	(British) 1894
	18,394	(German)

Knight's Mechanical Dictionary Vol. 1 (1874), page 775. Title: Ejector.

Knight's Mechanical Dictionary Vol. 2 (1875), page 1186. Title: Injector.

New American Mechanical Dictionary Knight 1882, page 52. Title: Aspirator.

H. They further allege, on information and belief, that said alleged invention was in public use and on sale in the United States more than two years before said John H. McMichael made application for patent covering the same, and that the patentees named in the next preceding paragraph had knowledge of such public use and sale, the names and addresses of such persons being fully set out in said Letters Patent cited by way of anticipation.

[fol. 10] I. They allege on information and belief that said complaint (when taken in connection with said patent in suit No. 1,127,660, and also in connection with the file-wrapper and contents of said patent, the same being a documentary history of the prosecution of said patent in the U. S. Patent Office) fails to state facts sufficient to constitute a valid cause of action in equity for the following reasons:

(a) Because the patentee of the patent in suit abandoned the invention as originally filed in that he submitted to rejections of claims as originally filed and as amended, and cannot now be heard to set up other or further claims which are inconsistent with his original disclosure of invention, or with such abandonment;

(b) Because new matter was introduced into the specification and claims which was inconsistent with the original disclosure and beyond the scope of the original oath made in connection with the original application; and that therefore the claims as allowed are not supported by an oath as required by the United States Statutes in such case made and provided;

(c) Because the plaintiff became estopped to deny the invalidity of the claims of the patent by reason of the acts of the patentee in the course of the prosecution of said application for patent;

(d) Because the statement on the face of the patent with reference to the prior state of the art, between lines 29-50 inclusive, page 4, and the statement on page 3, lines 95-103 inclusive, amounts to such disclaimer of invention on the [fol. 11] part of the inventor as to negative any right to the inventions claimed in the patent in suit, or in those claims upon which infringement is specifically alleged;

(e) Because the renewal of said application (which is alleged to have been accomplished as of the date of January 23, 1911) was not accomplished according to the requirements of Rules 172, 175 and 176 of the Rules of Practice of the U. S. Patent Office, or according to the requirements of the Revised Statutes of the United States, Sections 4894 and 4897; and because said application was abandoned for failure to complete or prosecute the same, and because the said applicant did not show facts sufficient to justify such renewal, and failed to show that his delay in such application was unavoidable, and because the said application before renewal was not made within two years after the allowance of the original application, and did not bear date of the time of the renewal, and was not subject to examination like an original application.

Wherefore, these defendants humbly pray that the complaint be dismissed with costs and disbursements.

Powers-Kennedy Contracting Corporation, by —— Bingham, Vice President. Anthony G. Fleck, Albert F. Nathan, Solicitor and of Counsel for Defendants.

[fol. 12] *Duly sworn to by Bingham and Anthony G. Fleck. Jurat omitted in printing.*

[fol. 13] In United States District Court

Order Amending Answer

This cause coming on to be heard in open court on the regular motion calendar, June 15, 1926, on the motion of defendants to amend their answer, and John D. Morgan, Esq., and Allan M. Johnson, Esq., appearing for the de-

fendants, and Stephen J. Cox, Esq., appearing for the plaintiff, and the Court being fully advised of the amendments sought to be made to the answer of the defendants heretofore filed in this case, it is:

Ordered Adjudged and Decreed, that the motion be granted and that the following amendments be allowed, and the Clerk of the Court is hereby ordered to file the same as the date of this order as an amendment to the original answer:

On page 5 at the end of paragraph "G" insert:
W. H. Smith, 122,497, Jan. 2, 1872.
W. H. Smith, 122,498, Jan. 2, 1872.

[fol. 14] On page 5 at the end of paragraph "H" insert the following:

They further allege that said alleged invention was in public use in the United States more than two years before said John H. McMichael made application for said patent on January 14, 1907, to wit:

(1) In 1900 by William Artingstall, civil and licensed structural engineer, with offices at 1206 Union Trust Building, Chicago, Illinois, and Haley-Ward Company of Watertown, New York, in the construction of a head race or water channel near Black Rock, New York, which is near Watertown, N. Y.

(2) In 1903 by Jackson & Corbett Bridge & Steel Works of Chicago, Illinois, and George W. Jackson and John T. Fanning in laying a concrete floor and underpinning at 177 East Monroe Street (old number) City of Chicago, Illinois.

(3) In 1901, latter part of the year, by the Jackson & Corbett Bridge & Steel Works of Chicago, Illinois, Geo. W. Jackson and John T. Fanning, in the Illinois Tunnel Company's tunnel in Chicago, Illinois, adjacent the Powers & O'Brien shaft, Shaft No. 1.

(4) In 1902 and 1903, and later, with different machines, by the same parties in the Illinois Tunnel Company's tunnel in Chicago, Illinois, adjacent the Powers & O'Brien shaft, Shaft No. 1.

It is further ordered, adjudged and decreed that if this case can be heard this term no bond need be filed. If, how-
[fol. 15] ever, the case cannot be heard this term, and goes over to the Fall term, then the granting of this order to amend is subject to the defendants filing a bond for five thousand ($5,000) dollars, in favor of the plaintiff, to cover any possible judgment that may be finally entered in its favor for infringement of the patent in suit.

John C. Knox, U. S. District Judge.

New York, N. Y., June 16, 1926.

The entry of the foregoing order is consented to.

Stephen J. Cox, Attorney for Plaintiff.

New York, June 16, 1926.

In United States District Court

Memorandum—Filed June 21, 1926

It appearing that the present Equity term of the court will end June 25, 1926, I have signed the within order. Obviously the plaintiff cannot investigate the new defense sought to be interposed within ten days. The case should therefore go over until Fall as the delay has been occasioned by the new defense. I think the suggested bond should now be filed. Over the Summer, however, plaintiff must make its investigation of the new defense and be prepared for trial in October.

Jno. C. Knox, U. S. D. J.

[fol. 16] In United States District Court

Plaintiff's Interrogatories

And now comes the plaintiff and moves the Court for leave to file the following interrogatories, to be answered by the defendant Anthony G. Fleck under oath, and gives notice that the same will be presented to the Court, and this motion for leave to file the same and for an order directing

the defendant to answer them, on Friday, February 27th, 1925, at 10 o'clock A. M. or as soon as the matter can be heard, at the session for the hearing of motions to be held on that date in the Court Room in the Federal Building, of the Borough of Manhattan, City of New York.

1. Do not the annexed pages from the Magazine as the Engineering News-Record published and circulated in the United States and being pages 264-268 of a copy of the number of said Magazine published February 12, 1925, correctly describe and illustrate the work now being carried on and carried on since the grant of the patent in suit and prior to the commencement of this suit by the defendants in the Southern District of New York, as stated therein?

2. Does not the said article correctly describe and illustrate the work carried on by the defendants at the time and place stated in the last question under the heading "Placing Concrete"?

3. Is not the statement of the said article under the heading "Personnel" a correct statement of facts?

[fol. 17] 4. Are not the same things set forth in the last three questions true also of the article published and circulated in the United States in the Compressed Air Magazine of June 1924, of which a copy is hereto annexed, and particularly the description and illustrations on pages 901 and 902, the description beginning with the words "The placing of concrete" on page 902?

5. Was not the pneumatic concrete conveying and placing device illustrated in Figure 12 of the Engineering News-Record article and in the bottom illustration of page 901 of the Compressed Air Magazine article constructed and operated as follows:

Concrete was dumped into the drum or vessel D through its top and the top closed. The compressed air was then admitted to the top of said vessel and above the mass of concrete therein at A and air pressure thus established behind the said mass tending to force it down over the smooth walls of the funnel shaped lower part B and through the outlet E of said vessel to and through the extending conduit or passageway C to the forms, and compressed air was also

admitted to the outlet through the nozzle F and into the moving concrete.

"5a. If the answer to interrogatory 5 is not wholly affirmative, state exactly how the said pneumatic concrete conveying and placing device was operated and what variations, if any, in its operation were practiced to your knowledge?"

6. Was not the said machine for conveying and placing concrete pneumatically built for the defendant, Power- [fol. 18] Kennedy Contracting Corporation under the direction of the defendant, Anthony G. Fleck since the grant of the patent in suit and prior to the commencement of this suit?

7. Was not the said machine installed on the said job for the said corporate defendant under the direction of the said defendant Fleck?

8. Was not the said machine placed in operation on the said job under the direction of the said defendant Fleck for the said corporate defendant?

9. Was not the said machine actually operated on the said job by the defendant Fleck for the said corporate defendant and did he not advise and instruct others in the employ of the said corporate defendant in the use and operation of the said apparatus?

10. Which of the forty-eight patents and publications set up in the answer of the defendants herein will be used by the defendants at the hearing in support of the allegations of the answer that the patent in suit is anticipated?

11. Which of the forty-eight patents and publications set up in the answer of the defendants herein will be used by the defendants at the hearing in support of the allegations of the answer that the patent in suit is lacking in invention? [fol. 19] The foregoing interrogatories are propounded for the discovery by the opposite parties of facts material to the support of the cause, and the defendant Anthony G. Fleck is required to answer each and all of them, on behalf of defendants. In case he is not able to answer any of the said interrogatories or is not able to answer any of them fully, then John J. Kennedy, Treasurer and General Mana-

ger of the corporate defendant and Henry L. Kennedy, General Superintendent of the said corporate defendant are required to answer the same and to answer them fully; and motion is hereby made for an order allowing the plaintiff to file each and all of said interrogatories to be answered by the said officers of the corporation and directing the said officers to answer the same.

And in case of the failure or refusal of the defendant Fleck, or the said officers to answer the said interrogatories fully, or such of them as may be allowed by the court, the plaintiff will ask the court for an order for the examination of such officers upon such interrogatories, and for such other and further relief as to the Court may seem just in the premises.

Dated February 21, 1925.

Stephen J. Cox, Plaintiff's Solicitor, 233 Broadway, New York City.

To Albert F. Nathan, Esq., Defendants' Solicitor, 149 Broadway, New York, N. Y.

[fol. 20] Open Cut and Tunnel in Manhattan Schist

Queensborough Cross-town Subway Extension at Forty-Second St., Manhattan, Calls for Careful Methods in Safeguarding Crossing Tunnels and Water Mains

Underground railway construction in its most difficult aspects is illustrated by the work now well advanced on the Queensborough Subway extension across-town at 42nd St., in New York. Abutting buildings, contiguous water mains and sewers and other subways running above or across introduce exceptional hazards while heavy rork excavation and the erection of steelwork and concrete placing below busy streets without hindrance to traffic or annoyance to business demand the construction in detail which characterizes subway building under city streets. It is as a series of special operations, therefore, that the new cross-town rapid transit line has to be considered.

Route and General Plan.—The route of the new subway is shown in diagram by Fig. 1. The Queensborough subway from Long Island crossing the East River on the line

of 42nd St., Manhattan, terminates at Vanderbilt Ave. Its train terminal is the Park Ave. and Grand Central Subway Station. From here, west across-town to the Broadway and the Seventh Ave. Subway Station at Times Square, the transfer of passengers has been by shuttle trains accom-odated by taking over the 42nd St. spur of the Seventh Ave. Subway. This shuttle train service has grown inadequate and besides it requires a change of trains. The new [fol. 21] line is intended to relieve the congestion and delay by providing a parallel cross-town route. It is an extension west of the Queensborough subway which provides through train service between Times Square Station (Seventh Ave. and Broadway) and Queensborough. The traffic services of the new line need not be further indicated except to observe that there is an intermediate station (between Times Square and Grand Central) at Fifth Ave.

Turning to the map, Fig. 1, the route, stations and sequence of open-cut and tunnel construction are clearly indicated. In detail the construction required is as follows: From the old Steinway tunnels terminal, 74 ft. below street grade, twin tunnels on a rising grade extend to a little west of Fifth Ave. From the ends of the twin tunnels west something over 500 ft. is open-cut emplacement for the Fifth Ave. Station. Here the depth to subgrade is about 45 ft. Then comes double-track tunnel under the corner of Bryant Park and Sixth Ave. and along 41st St. to near Broadway. An open-cut station excavation carries the work to about midway between Seventh and Eighth Avenues. Thence, to a dead end at about the middle of Eighth Ave., is double-track tunnel. At Seventh Ave. the depth is about 55 ft. There are in tunnel and open-cut 226,000 cu. yd. of excavation of which 189,000 cu. yd. are rock. The total length of the line is 3,660 ft.

From the outline of the work, it will be observed that subways cross over the new line on Seventh Ave. and on Broadway and for the distance that the new line is within 42nd St. Where the line skirts the Public Library building [fol. 22] and in 41st St., where it fills the street between curbs, there are contiguous building foundations to be considered. Crossing sewers and water mains furnish a third type of hazard. The ways of meeting the hazard in each case indicate general procedure also.

Sewer and Pipe Crossings.—The most important conduit crossings under-run by the subway have been a 6-ft. sewer between Vanderbilt and Fifth avenues and four lines of 48-in. water mains at Fifth Ave. In the case of the sewer the cover over the excavation to the bottom of the sewer was 4 ft. There was a 10-ft. cover between excavation and the water mains. Somewhat different methods of driving underneath were adopted in the two cases, both however based on the theory of close shallow holes and light blasts.

Under the sewer the construction was parallel twin tunnels, with a separating rock core and inside structures of steel bents with concrete arches between them. The cut for each tunnel was 16½ x 17 ft. It was normally taken out in a heading about 20 ft. ahead of the bench and in a bench 7 to 9 ft. high. On approaching the sewer short holes were put in close together and light charges were fired. This broke out the rock in small pieces and reduced the blasting shock and shattering to insignificant amounts. Moreover the bench was kept close to the heading and the lining was kept snug up to both.

In case of the water mains in Fifth Ave. and a bottom heading 9 x 8 ft. was driven and enlarged. Using many short holes the sides of the heading were widened and the roof was raised by many small blasts. The dynamite was [fol. 23] 60 per cent. Virtually the roof rock was peeled off in layers. This procedure with a 10-ft. cover hardly shook the water mains. It should be noted, however, that in case of both sewer and mains the underlying schist rock was hard, dense and solid.

Besides the mains there had to be passed, on the west side of Bryant Park, a shaft to the pressure tunnel under Manhattan of the Catskill adequate system. Both shaft and tunnel are filled with water under pressure. From the side of the tunnel to the side of the shaft was 30 ft. Ordinarily in the heading 26 to 28 holes were used. In passing the water shaft the number was increased to 126 largely on the side and crown nearer the shaft. The heading on one side was in effect line drilled and wedged out by light blasts.

Subway Crossings.—Illustrating, even better, blasting in detail as a means of under-running other structures, are the Seventh Ave. and the Broadway subway crossings and the shuttle line on 42nd St. east of Fifth Ave. Con-

sidering first the direct crossings as the more simple, the general under-crossing procedure has been developed as indicated in diagram by Fig. 2.

At the crossing the roof of the new tunnel is up against the floor of the old tunnel. As the side wall of the old tunnel is approached the rock is removed for the insertion of plate girder *A* spanning the new cut and carrying the side wall of the old subway. Then entrance is made to the old subway and beams *a* and *b* are set under the rails and spanning the new cut, and are encased in concrete. Driving is then begun using many holes and light charges until [fol. 24] the face is removed so that columns 1*a* can be erected and the lining placed. Driving ahead, columns 2*b* are put in. Then beams *c* and *d* are installed and driving and lining proceed until track II is supported. By the same process tracks III and IV are under-run.

In 42nd St. the relation of the new subway to the shuttle line above is shown by Figs. 3 and 4. Here the new structure is parallel twin tunnels. As shown by Fig. 5, a bottom heading driven from both ends was put through in each tunnel. Then the roof was raised by close, shallow holes and light blasts keeping the lining structure erected close up to the face. The illustration indicates the character of the rock which here is dense, solid and hard. Construction has proceeded past the point of thinnest cover between the new subway roof and the old subway floor and from this point on the cover will thicken. It is, however, considered by the engineers of the Board of Transportation that to proceed by this method introduces too great a hazard to the operating subway and excavation has been ordered stopped, although the contractors, with a large bond to guarantee security, had so arranged the work that with a 4-ft. solid rock lintel, overhead, the superimposed load of the old subway columns would in no case be more than 15 in. from direct support beneath. The contractors have acceded to the engineers' demand, but presumably will require compensation for the resulting delay and extra expense.

In the cut for the Broadway-Seventh Ave. station the street had to be kept free for traffic. Plate girders were [fol. 25] used to span the cut. They were held up at the ends by posts standing on the rock, and carried a timber

flooring. As at the Fifth Ave. cut, the plan was to keep the cut as free as possible from timbering. In general this is the outstanding feature of all the work, tunneling as well as open cut.

Driving Tunnel.—Where the excavation is two parallel tunnels east of Fifth Ave.—a top heading of about half of the 16½ x 17-ft. section was driven using 53 holes 2 ft. deep. A shot took out 6 or 7 ft. The bench was kept 20 ft. behind the heading. The drills were 2¼ in. to 1⅝ in., with ⅛-in. drop for each change of steel. A heading round required about 65 steels and a bench round required 20 steels. As has been described this normal practice was changed when under-running conduits and subways.

Under Bryant Park and 41st St. the tunnel was largely umbrella section—that is, two arches carried on center and side walls. Generally the rock was hard, although seamed, but in one place for some distance it was rotten. There have been variations in detail but in general the process has been to drive a top heading, Fig. 9, and then deepend it to form a center cut, Fig. 10. In this center cut the forms for the center wall and its umbrella top were erected, Fig. 11 and filled. Widening out then began in such manner that the roof arches could be put in resting on rock benches at the sides. Finally the rock benches were taken out and replaced with concrete, thus completing the side walls. The method cut down timbering, gave quick permanent roof support and left the space below the roof re- [fol. 26] markably clear for hauling and other work. It was adopted as a particularly safe method in uncertain rock.

Placing Concrete.—All concrete has been placed by compressed air. This process has been found by the contractors to have particular merit. The pipe line takes up little room and it can be nosed into almost any space to be filled, even close up to the excavation. Examination and test show the concrete to be dense and uniform. The delivery in small batches is peculiarly adapted to concreting generally small-volume units.

Three concreting plants have been operated, two of 1/3-cu. yd. and one of 1/6-cu. yd. batch capacity. All are located in the excavation and the arrangement is alike for

all. At the sheet surface there is a hopper into which trucks dump sand and stone. The hopper delivers the aggregate into a sand bin or a stone bin below the surface. These bins have side gates which deliver into a measuring hopper. Cement chuted in bags from the street surface comes to the measuring hopper platform and is there added to the stone and sand batch. The measuring hopper empties into the mixer on a staging beneath. In turn the mixer discharges into a hopper and closed chute to the body of the compressed air concrete gun.

Essentially the gun, as shown by Fig. 12, is a conical drum with charging and discharge connections and with valves and air connections. When charged with concrete the proper valves are operated, air is turned on and the batch is forced out of the drum and driven through the discharge pipe line to the point of deposit. In the subway operations the air pressure has ranged from 65 to 80 lb. [fol. 27] It has been possible to shoot a batch a minute. With the three outfits 160 cu. yd. of concrete have been placed in a shift. A 6-in. discharge pipe line has been used in all instances. The maximum delivery which the work will require is 1,500 ft. So far one of the larger guns has delivered through 1,160 ft. of pipe, with nine right-angle bends, to a height of 57 ft. above the drum. At the end there was a vertical lift of 24 ft. It will be noted that the gun is not depended on for any mixing action, it is simply a device for delivering concrete already mixed in the regulation manner.

Power Plan.—Compressed air is furnished by a plant on the East River front at about 42nd St. There are two electrically driven compressors, one direct-connected 14 and 22 in. x 20 in. with a capacity of 1,600 cu. ft. of free air per minute and one belt-connected 10 and 16 in. x 14 in. with a capacity of 660 cu. ft. at 80 lb. These compressors operate the drills, pneumatic tools, concrete guns, hoists and pumps. The mixers are motor-operated.

Personnel.—Contract for construction was awarded April 21, 1922, to the Powers-Kennedy Contracting Corporation of New York, A. J. Powers, president, John J. Kennedy, treasurer and general manager, and Henry L. Kennedy, general superintendent. Albert Carr was engineer for the contractor during the early part of the work and on his

death Henry B. Seaman was engaged. The direction of the work is under the Board of Transportation, Robert Ridgway, chief engineer.

[fol. 28] Constructing a Difficult Subway with Consummate Skill

Work on Queensborough Subway Extension in New York City Going Steadily Forward

By A. S. Taylor

The placing of concrete forms one of the most interesting features of this great undertaking, and the means employed by the contractors to do this are deserving of special mention. Compressed air has proved a prime aid in operating the facilities utilized in speeding up this part of the job. The pneumatic placing of concrete is not, in itself, a novelty; but conditions in the case of the Queensborough Subway Extension have called for apparatus which would be sufficiently flexible to deal with the continually changing demands.

Three concrete placers or "shooters," as they are called by the men on the work, are in service. Two of these are capable of shooting a third of a cubic yard of concrete at a time, while the capacity of the smaller outfit is one-sixth of a cubic yard. The placers were built by the Pneumatic Concrete Machinery Company and have been adapted by the contractor to meet his particular needs. One of the larger shooters has delivered concrete a total distance of 1,160 feet, sending the batch through a 6-inch line in which there were nine 90-degree turns. The material mounted a total of 67 feet on the journey—24 feet of which was a straight rise at the end of the run. As Mr. John J. Kennedy has expressed it: "One hundred per cent of the stuff that goes into the mixer is shot into the forms, no matter how far the forms are away from the shooter."

[fol. 29] The air pressures used have ranged from 65 to 80 pounds per square inch; and it has been possible to shoot a batch a minute with each of the outfits. In a day the three shooters have placed 157 cubic yards of concrete; and they have made it feasible to erect steel-work and to complete concreting close up to the advancing headings. In short, concreting has been done where it could not be

placed by hand; and the machines have produced better and more finished jobs.

In United States District Court

Answer to Plaintiff's Interrogatories

The defendant, Powers-Kennedy Contracting Corporation by John Kennedy, treasurer and general manager, answers plaintiff's interrogatories as follows, the numbers of the answers corresponding to the numbers of the interrogatories:

1. Yes.
2. Yes.
3. Yes.
4. Yes.
5. No.

5a. Concrete was dumped into the drum or vessel D through its top and the top closed. Then the valve in the compressed air supply was opened and the batch of concrete passing down the outlet E was ejected or shot into the conduit C to the forms by pneumatic pressure passing through the nozzle F.

[fol. 30] 10. Both defendants will rely upon all the prior art cited in the answer to establish that the patent in suit is anticipated.

11. Both defendants will rely upon all the prior art cited in the answer to establish that the patent in suit is lacking in invention.

John J. Kennedy.

Duly sworn to by John J. Kennedy. Jurat omitted in printing.

[fol. 31] IN UNITED STATES DISTRICT COURT

[Title omitted]

Case

Before Honorable Augustus N. Hand, District Judge

New York, October 4th, 1926—12 M.

Statement of Evidence

APPEARANCES OF COUNSEL

Stephen J. Cox, Solicitor and Counsel for Plaintiff.
John D. Morgan, Solicitor for Defendants, John D. Morgan and Alan M. Johnson, Counsel.

(Mr. Cox stated to the Court.)
(Mr. Morgan stated to the Court.)

[fol. 32] OFFERS IN EVIDENCE

Prima Facie Proofs

Mr. Cox: I will offer in evidence a stipulation providing for uncertified copies of the patent in suit, and other patents and also for the use of exhibits from the Ulen suit without certification, as papers in that suit.

(Marked Plaintiff's Exhibit No. 1.)

I will now offer in evidence a copy of the patent in suit.

(Marked Plaintiff's Exhibit No. 2.)
(Claims 2, 4, 5, 6, 8, 9, 12, 15, 17, 19, 21, 22, 24, 28, 31, 32, 34 and 35 relied on.)
(Counsel for the plaintiff read to the Court the interrogatories, together with the answers thereto.)
(Counsel cited the following to the Court: Page 902 of the Compressed Air Magazine, published in June, 1924. Engineering News, page 266.)

Recess.

ANTHONY G. FLECK, called as a witness on behalf of the plaintiff, being duly sworn, testified as follows:

Direct examination.

By Mr. Cox:

Q. 1. Mr. Fleck, you are one of the defendants in this case?

A. Yes, sir.

Q. 2. And you were subpœnaed to attend here today?

A. Yes, sir.

[fol. 33] Q. 3. Have you got that subpœna with you, or a copy of it?

A. Yes, I have a copy of it here, or, rather, the original.

Q. 4. Did you bring with you, as required in that subpœna, drawings or illustrations of the defendants' machine?

A. I submitted some drawings to Mr. Johnson previously, that is, blueprints. I believe he has those in his possession. This is one of them (indicating), and here is another (indicating).

Q. 5. In answering the interrogatories propounded to you in this case, you referred to the cut of the defendants' machine published in the Compressed Air Magazine, did you not?

A. I believe they were attached, were they not? Yes, sir.

Q. 6. This drawing which I exhibit to you is an enlargement of that cut at the bottom of page 901 of the Compressed Air Magazine, and figure 12 of the cuts in the Engineering News Record? (Handing documents to witness.)

A. Yes, sir, those are they.

Mr. Cox: I will offer this photo in evidence, so that we will have the large illustration.

(Enlarged photo of the cut referred to on page 901 of the Compressed Air Magazine was received as Plaintiff's Exhibit No. 3.)

Q. 7. Referring to this drawing which is marked Plaintiff's Exhibit 3, I would like you to state what the part marked D as shown in the drawing is.

A. What it is?

[fol. 34] Q. 8. Yes.

A. Just part of the equipment. It does not answer any particular purpose. It is just a closure. That is the best way to put it.

Q. 9. I mean the vessel marked D.

A. To distinguish that from the lower section?

Q. 10. Yes.

A. That is just a closure.

Q. 11. That is a vessel to hold the concrete, is it not?

A. Yes, sir.

Q. 12. To hold the concrete to be conveyed and placed?

A. Receptacles, yes, sir.

Q. 13. What is this part designated by the letter A?

A. That does not refer to a pipe, does it?

Q. 14. Yes, this part connected by a line to the letter A, what is that?

A. This circular section is just a casting. It is the general design of the make-up of the machine. That is simply a battery of air inlets in there.

Q. 15. This letter A refers to one of a battery of air inlets at the top of the machine?

A. That is a series of pipes going around there.

Q. 16. There is a pipe running from that air inlet away to the right. What is that pipe?

A. That is a pipe for the admission of air at times.

Q. 17. At the top of the vessel?

A. Yes, that is a feed pipe for that battery.

Q. 18. You are referring to the pipe which I now mark A^1, is that correct?

A. Yes.

Q. 19. Below the reference letter D there is a reference letter B. As I understand it, that is the lower tapering part of the vessel for holding the concrete?

A. Yes, sir.

Q. 20. Then at the bottom of the vessel there is an outlet marked E, is there not?

A. Yes, sir.

Q. 21. Then, leading away from that is a pipe or conduit [fol. 35] marked C?

A. That C refers to that joint, does it not? In back of that joint is a part of the bottom outlet.

Q. 22. The delivery pipe or conveying conduit extends away from that bottom outlet C?

A. Well, that C may refer to the piping you have got there. This is one fitting from here to here (indicating). C can be the discharging pipe, if you want to put it that way. It can be the orifice there.

Q. 23. C and E are all one fitting in the construction?

A. Yes, it is one casting.

Q. 24. Then the conduit or conveying pipe is this part in the photograph, the enlargement, which I am now marking J, is that correct?

A. That is part of the delivery pipe.

Q. 25. From C to J there is an upward bend in that pipe?

A. There is in that particular job, yes, sir.

Q. 26. Now, in the machine as actually used in the Queensboro subway tunnel by the defendants, did this delivery pipe J extend upwardly to a point above the machine?

A. Well, it all depends. If they were shooting at the bottom of the tunnel that would run out on the same level. If they were putting in an arch on a higher elevation, and I understand they went up fifty or sixty feet, it would naturally rise. It all depended on the location of the deposit. I believe in some cases they even shot below the machine. Of course, I was not there. You leave that pipe wherever you want it.

Q. 27. When the concrete was placed in the upper part of the forms of the tunnel, this pipe J ran up above the [fol. 36] machine, and then along horizontally?

A. Yes, it depends on the location.

Q. 28. Here at the top of this machine there is what appears to be a feeding hopper. Is that what was taken. That is a chute leading from the regular concrete mixer into that pneumatic placing machine. I guess it is a bag around there, or something.

Q. 29. You are referring to the part which I am now marking H?

A. Yes, that may have been a chute. It might be a piece of pipe. It looks like a rectangular chute from here.

Q. 30. What is this bulbous looking portion here, below H?

A. That is just a flared section. You see, the opening in the machine is about twelve inches, and this may be about two feet. It is just a lead to it, you might say.

Q. 31. And the concrete coming down the chute H was received in that part which you are now referring to?

A. Yes.

Q. 32. I will mark that G. That is the part referred to, is it not?

A. Yes, sir.

Q. 33. This part marked F at the bottom of the figure is a compressed air jet entering the outlet of the machine, is it not?

A. Blows right straight through there, yes, sir.

Q. 34. I notice that the man on the right has his right hand on what appears to be a valve handle. Is that a valve for admitting compressed air to the jet F?

A. Yes, that is the lower valve.

Q. 35. For admitting air to the jet F?

A. Yes, sir.

Q. 36. That is the part that I will now mark K. Is that right?

A. Yes, sir.

[fol. 37] Q. 37. Can you see that he has his left hand on a valve handle above K?

A. That is very indistinct. It is hard to tell. You very often lean your hand up there. You get tired running all day, and it is a good place to lean on.

Q. 38. At any rate, this part that I will now mark L, that is a valve controlling the air to the air inlet A, is that correct?

A. No, sir, that is not a valve you are referring to. It is a relief valve, that is what I call it, the one you just marked. That is only used when a machine gets plugged up, and you want to get the air off of it. That is a relief valve.

Q. 39. What is this part that I mark M here? Is that a valve controlling the compressed air to the inlet A?

A. That valve if operated would allow air to go into the upper section, yes, sir.

Q. 40. Can you tell whether the operator has his hand on that valve M in the picture?

Mr. Morgan: I object, your Honor. The picture shows for itself. The photograph is the best evidence

A. I could not tell where his arm is on that. He may be just having his hand resting on the pipe. I could not distinguish that. It is very obscure.

Q. 41. At any rate, that is a valve, that M which when operated admits compressed air to the top of the vessel D?

A. Yes, sir.

Q. 42. Now, between the receiver G and the vessel D, there is a door, is there not?

A. Yes, sir.

Q. 43. And how is that door closed?

[fol. 38] A. The door is closed by a finger or lever which is operated by a compressed air cylinder.

Q. 44. Is this pipe which I now mark N the compressed air pipe whch operates the door-closing cylinder?

A. Yes, sir.

Q. 45. And there is a valve on that pipe also; is't there?

A. Yes, sir. He may have his hand on that valve.

Q. 46. The valve controlling the door closing cylinder is between M and K, is it not?

A. Yes, you can see right from here that it is above his wrist there.

Q. 47. In this picture there is something to the left of the operator on the right, a round object. That is a pressure gauge, is it not?

A. Yes, sir.

Q. 48. That is the part which I will mark O, is it not?

A. Yes, sir.

Q. 49. That gauge shows the pressure of air on the pipe leading to the top of the vessel, does it not?

A. That gauge there shows the pressure of the air that is being supplied by a condensor. It is on the air line. It is your initial pressure. It is immaterial where you use it. Any air that goes into that machine, the initial pressure is marked by that gauge at the left hand of the operator.

Q. 50. That gauge indicates the air pressure on the machine?

A. The air pressure available, yes. sir. Not on the machine, but available.

Q. 51. Now, to the right of this operator and up near the top of the machine is another round object. What is that?

A. That is another gauge.

Q. 52. That is the part which I am now marking P, is it not?

A. Yes, sir.

Q. 53. And on what pipe is that pressure gauge located?
[fol. 39] A. That gauge is attached in that upper casting there somewhere around that mark A.

Q. 54. Does that show the pressure of air in the top of the vessel?

A. At different stages. When the material is out in the pipe it shows the pressure in the pipe. It shows the resilient pressure that is in the pipe. Until the material is all out of that receptacle, it would show the pressure that is above the concrete. After that it shows the pressure that is behind the material, or that is passing through the pipe.

Q. 56. From the time the compressed air is turned on with concrete in the vessel until the vessel is empty, that gauge P shows the pressure at the top of the vessel?

A. Not necessarily the top of the vessel. Any part of the whole apparatus. If you are shooting that concrete, say, five or six hundred feet it is just a question of some seconds before the material is out at that point, and whatever pressure you have from that point back to the machine also registers. That is the total pressure that is in the equipment as a whole.

Q. 56. That gauge P, though, communicates with the top of the vessel?

A. Yes, sir.

Q. 57. And the gauge O communicates with L?

A. Yes, sir.

Q. 58. And the gauge also, I assume, communicates with the pipe leading to the bottom jet F?

A. It is in that course of air travel, yes, sir.

Q. 59. These blueprints that you have produced, marked P. N. 40, and the other without a date, but showing a vertical section, illustrate the construction of the machine about which I have been asking you, do they not?

A. Yes, sir.

[fol. 40] OFFERS IN EVIDENCE

Mr. Cox: I will offer them in evidence, the elevation as Plaintiff's Exhibit 4, and the assembly drawing as Plaintiff's Exhibit 5.

(Marked Plaintiff's Exhibits Nos. 4 and 5.)

Mr. Johnson: No cross examination.

Mr. Cox: I wish to offer in evidence in this record as a physical exhibit some of the papers in the last suit, so that this record will show the issues on which the suit was based.

Mr. Morgan: I suggest you give the whole record as it is. There is a stipulation, I understand, that either side may offer that record if they see fit. If you see fit at the present time to offer part of it as a physical exhibit under that stipulation, we have the right to do the same later on, and we will have a rather complicated set of exhibits here, all relating to one thing. I think if we put in that whole thing at one time, the other parts will do no harm,, and we will have no trouble about it. I suggest that the whole record be offered as it is.

The Court: You may offer what you like of it, or offer the whole.

Mr. Cox: I wish to offer in evidence the bill of complaint, the answer, opinion of Honorable Learned Hand, order amending bill, answer of defendant Shandaken Corporation, stipulation permitting amendment of bill, and answers, amendment to bill, amendment to answer of Ulen [fol. 41] Corporation, amendment to answer of Shandaken Corporation, order amending answer of Ulen Corporation, order amending answer of Shandaken Corporation, and reply of Ulen Corporation to demand for particulars. They are, generally speaking the pleadings in the case on which the case was tried.

Mr. Morgan: Your Honor, we object to the offering in evidence of this portion of the printed record in the other case. We object to it first on the ground that it is irrelevant and immaterial, in every way. We suggest, however, that if opposing counsel want to offer the whole record, many parts of which are relevant, we will then withdraw our objection.

The Court: Objection sustained.

Mr. Cox: I wish to offer in evidence the two opinions, one by Honorable Learned Hand, and one by your Honor on final hearing.

Mr. Morgan: We make exactly the same objections that we did before on exactly the same grounds, and again make the same offer, that if the entire record is offered as a physical exhibit, we will withdraw our objection.

The Court: I will let him file copies of those opinions to aid the Court, if he wants to. I will sustain the objection to the offer, except that if he wants to put in the opinions, I will allow him to do it.

Mr. Cox: That is all I will offer at this time, then. I offer the opinion of Learned Hand as Exhibit 6, and the [fol. 42] opinion of your Honor as Exhibit 7.

(Considered marked Plaintiff's Exhibits Nos. 6 and 7 for reference of counsel.)

Mr. Cox: I would like to offer in evidence the decree in the Ulen suit.

Mr. Morgan: The same objection that was made and on the same ground, and the same tender as to the record in toto is made.

The Court: I will sustain your objection.

Mr. Cox: I have here witnesses who will testify briefly, if your Honor cares to receive such testimony, as to the success of the patented device. That was all put in in the other case.

The Court: Why do not you offer that? They have got a stipulation, have they not, that covered that?

Mr. Cox: Yes, the stipulation covers anything we may wish to offer.

The Court: I think you had better offer it. That has a bearing on the case.

Mr. Cox: I offer the deposition of Harry B. Kirkland, printed on pages 41 to 63 of the appeal record under the stipulation which admits evidence in the other case. Also the deposition of Arthur P. Robinson following it on pages 63 to 67, inclusive.

Mr. Morgan: The offer is objected to, first, on the ground that the depositions are irrelevant and immaterial in the present case, insofar as is shown by opposing counsel.

In the second place, we object to the transcript of record [fol. 43] in the preceding case being offered in this piecemeal manner, instead of in toto.

In the third place, we object to these depositions going in this case because it deprives us of the right of cross examination of the witness if they have testimony bearing on the issues in this case which are different from the issues in the other case.

The Court: I thought you stipulated that it might be offered.

Mr. Morgan: Not fractionally.

(The stipulation was then read by counsel.)

The Court: Objection overruled.

(Depositions marked Plaintiff's Exhibits Nos. 8 and 9.)

Mr. Morgan: I take an exception.

Mr. Cox: Your Honor, I have compared the defendant's structure in the opening with the claims of the patent in suit, and I have Mr. Ray here as our expert who can cover the question of infringement. I do not know how far you want to go.

The Court: I will not hear anything now, until they put in their case.

Mr. Cox: That will close our case, then.

Mr. Morgan: In connection with your ruling, I think Mr. Cox's rebuttal should be limited to answering our case.

The Court: That is true, but he could have rested practically with an offering of his patent, and proving simply your structure. That, I understand, is done. If you give [fol. 44] evidence which makes it necessary for him to call on an expert, he has a right to call him.

Prima facie proofs closed.

DEFENDANTS' PROOFS

Mr. Johnson: Defendants offer in evidence as Exhibit A the certified file wrapper and contents of the patent in suit.

(Marked Defendants' Exhibit A.)

Mr. Johnson: We offer in evidence as Exhibit B a book of the prior patents and also a photograph of the British Patent and a Knight's Mechanical Dictionary that was used in the other suit. I will now read the different patents so that there will be no mistake about them:

122,497, Smith, January 2nd, 1872;

122,498, Smith, January 2nd, 1872;

179,055, Prindle, June 20th, 1876;
276,318, Beech, November 14th, 1882;
408,201, Wallace, July 30th, 1889;
599,055, Davidson, February 15th, 1898;
609,744, Hennig, August 23rd, 1898;
671,303, Warren, April 2nd, 1901;
747,396, Farham, December 22nd, 1903;
758,118, Sticker, April 26th, 1904;
837,113, Phillips, November 27th, 1906;
873,345, Canniff, December 10, 1907;
958,421, McIlvrit, May 17th, 1910;
British patent to Trewent, No. 12,758, June 30th, 1894;

[fol. 45] Knight's Mechanical Dictionary, pages 775, 776, 1185, 1186 and 52.

(Marked Defendants' Exhibit B.)

Mr. Cox: I would like, in order to save time and to clear the matter up, to ask Defendants' counsel to admit that all of these patents except the two Smith patents were set up in the answer of defendants.

Mr. Johnson: No, that is not true.

Mr. Cox: Which of them were not?

Mr. Johnson: McIlvrid.

Mr. Cox: No, sir; that was in the answer.

Mr. Johnson: I do not think that is in the answer of the first suit.

I will now offer in evidence a certified copy of the McIlvrid patent as filed in the Patent Office, that is Patent No. 958,421. That has already been offered. This offer is made because under the practice, which I do not understand the reason for, but nevertheless it is the practice, that if you wish to rely upon the filing date you have to file a certified copy of the specification other than in the printed copy.

We also offer in evidence that portion of the transcript of the record in Concrete Mixing and Conveying Company, Plaintiff-Appellee, vs. Ulen Contracting Corporation and Shandaken Tunnel Corporation, which has not been offered in evidence by the other side, so that the entire record may be before the Court as an exhibit.

[fol. 46] WILLIAM ARTINGSTALL, called as a witness on behalf of the defendants, being duly sworn, testified as follows:

Direct examination.

By Mr. Johnson:

Q. 1. Mr. Artingstall, will you please give your name, age, residence and occupation?

A. Name, William Artingstall; fifty years old; residence, Chicago, Illinois.

Q. 2. And your occupation?

A. Occupation, civil consulting engineer.

Q. 3. What education and practical experience have you had with building construction?

The Court: Do you call him as an expert?

Mr. Johnson: I have to qualify him, your Honor, under the decision of the Court of Appeals of this Circuit to show your Honor that he is qualified by education and training to testify as to the prior use.

The Court: That is all right.

Mr. Cox: We will admit that the witness is able to understand.

Mr. Johnson: No, sir; we want his qualifications on the record.

Q. 4. The question is what education and practical experience have you had on building constructions?

A. My education was gained through various schools, the University of Cornell, and according to the old English practice of a father who happened to be an Englishman, a [fol. 47] good deal of tutoring. In fact, I was brought up from the time I was a small boy and tutored, I might say, in civil engineering. My father was probably one of the best civil engineers in the United States. He brought me in contact with engineering work as far back as I can remember as a very small boy, and I naturally followed it. I followed in his footsteps.

I was engaged at various times from the time of my university experience until the present time in civil engineering. In the early stages of my experience I was engaged as an employee in various capacities until about 1913 or

1915, in that neighborhood, when I entered the consulting practice and have been in that ever since, maintaining a private office for consultation work.

In the last five years I have not done so much consulting work for the very simple reason I am in a position where I take what I please and do what I please. I sandwich in considerable pleasure with my work. In other words, I select what work seems to interest me.

I am at the present time also consulting engineer for the Commissioner of Public Works in Chicago, being his personal representative. His work involves—this department work involves all the engineering work taken up by the City except what we call local improvement work, works paid for by local assessment.

That work with which I am directly interested or may be consulted on, is waterworks, sewers, pavements, street cleaning and garbage disposal or other works in which I may be particularly qualified.

[fol. 48] Also I represent the Commissioner as his personal representative on the big railroad terminals which he was designated in the ordinance governing that work as being the representative of the City. This work involves about,—one terminal which is practically completed, involves about $60,000,000; the other one under way is about $110,000,000 as near as we can estimate at the present time. The other terminal which we are about ready to start has been estimated at about $320,000,000.

That I think in general covers my experience.

Q. 5. About how many employees are there in the department under you as general consulting engineer?

A. The Department of Public Works employs about ten thousand employees; that includes all classes.

Q. 6. Can you give me any approximate idea of the cost of the construction jobs that you were on before you began consulting engineering work for the City of Chicago?

Mr. Cox: How does that have to do with the witness's qualifications?

Mr. Johnson: It is necessary under the practice in this Circuit for me to qualify him.

Mr. Cox: How many people are working on the City of Chicago Department of Public Works?

The Court: I will sustain your objection. It is too elaborate.

Mr. Johnson: Exception.

Q. 7. What practical experience have you had with concrete and concrete construction?

[fol. 49] A. I have designed a great number of concrete works, and supervised the carrying out of the works. Three pretty large tunnels under the Chicago River, I think they were about two million or two million and a half dollars, a rather large job; and the Chicago Municipal Pier involving about five million dollars, is another job, and various street railway works and water works of various kinds and various locations.

Q. 8. Have you had any practical experience with the pneumatic conveyor for concrete?

A. Yes.

Q. 9. Please state what your experience in this line has been?

A. My first experience with a pneumatic conveyor was about 1901. At the time I was employed as engineer for Healy & Ward, Watertown, New York. At that time we had a rather difficult job of cutting a head race in which the water from the Black River was seeping through into the excavation, which made it very expensive work to carry on. I suggested at that time the possibility of cementing or building up a concrete dyke between the different layers of shale, this was a shale rock, and of course you know how that comes, just like so many leaves in a book. We tried to build up a concrete dyke in there and shut the water off from the River. Of course, this machine at that time was a very crude affair, but answered our purpose, and that was all that was necessary.

Q. 10. Have you recently made a sketch of that first machine for placing concrete by air?

A. I have arranged this from recollection, this memorandum.

[fol. 50] Q. 11. Would you recognize an enlargement of that, if you saw it?

A. I would.

Q. 12. I call your attention to this sketch at the top here.

Mr. Morgan: Mark that for identification.

(Marked Defendants' Exhibit E for Identification.)

Q. 13. The first sketch on Exhibit E.

A. Yes, sir.

Q. 14. Will you please describe in your own way just exactly how that machine operated?

A. That, as I said, was a rather crude machine. We did not go to any particular expense in building this up. This is a piece of cast iron flanged pipe (marked 1), an ordinary flanged water main. This was a cap which we used in ordinary water works for blocking off the end of a pipe (marked iron plate 2 and iron plate 3). These were holes drilled in (marked 4, 5 and 6), the iron plates 2 and 3.

Mr. Morgan: I think you had better use reference letters.

(A short recess.)

Mr. Johnson: Will you read the question and answer?

(Q. 14 and anwser thereto read.)

A. (Continuing:) In the operation of this machine the hole marked 4 was for an inlet, air inlet. The hole marked 5 was a hole for the inlet of materials. The hole marked 6 [fol. 51] was the discharge outlet from the machine proper. In using this machine the materials were mixed up and dumped into this hopper that we call No. 7. The valve D in the base of the hopper 7 was the opening through which the material dropped into the machine or the section of cast iron pipe which acted as the machine. The valve A was then opened, followed almost immediately by the opening of valve B, the material occupying the space depending of course on how much there was to be put in, whether it would be half way up the pipe or whether it would be more or less.

I will call particular attention, your Honor, to the part there which we had to insert afterwards, and that is this little plug labeled 8. The reason necessitating that was that the material would pile up along from the discharge outlet to the side of the pipe itself gradually getting to a point

where it was almost impossible to put any more material in, and we then would take a rod and take this plug off and take a small rod and work it around inside there and loosen up this material and discharge that out. That, I think, in substance and in brief is the description.

Q. 15. You spoke of the material, Mr. Artingstall. What materials were they?

A. In this particular case we were using sand, cement and water.

Q. 16. What do you call that?

A. I have always called that grout.

Q. 17. Is that thick or thin?

A. It is pretty thin material.

Q. 18. About the consistency of what?

A. Well, roughly, let us say, the consistency of thick cream. It is very sloppy stuff.

[fol. 52] Q. 19. How large was the diameter of the opening 4 that connected with the pipe in which valve A was located, approximately?

A. This machine was made up from ordinary material which a contractor would have on hand, steam-fitting material, water pipe materials and so forth.

These were steam valves and pieces of steam pipe. Valve A was a steam valve and valve B was a larger steam valve. This valve B was what what we called a butterfly valve, this is, it opened up with a full opening with one half motion.

Q. 20. You speak of a steam valve. Did you use steam or what did you use?

A. We used air.

Q. 21. About what pressure?

A. On that we did not use very high pressure, propably about,—the pressure was not necessarily very high because we did not have very high pressure to work against.

Our proposition was to get the grout into or between the layers of rock, which was only a short distance below our surface, twelve feet; and it was only necessary for a very little pressure, in the neighborhood of 30 pounds.

Q. 22. How large was the diameter of the hole No. 6?

A. That was approximately a 4-inch pipe.

Q. 23. And what was the diameter of the pipe that I have marked No. 9?

A. That was also the same size. In fact, when we got out here to a point we throttled it down, because we had only an inch and a half pipe running into the shale rock. We had to throttle it down; there was no necessity of carrying a larger pipe.

Q. 24. What distance did you have the discharge from [fol. 53] the receptacle which you designated No. 1? How far did you shoot it?

A. That ran only a short distance, not over twenty-five feet I would say at the outside.

Q. 25. Now, will you describe a little more in full just exactly how you operated the valve with relation to the charge?

A. The charge was mixed up first and put into this hopper (7). The valve B was opened and the charge dumped in the cast iron pipe plug. This valve B then had to be closed and that left the charge in an enclosed receptacle with no air either on top of it or behind it. The valve A connecting with the receiver, the air receiver running directly from the compressor.

You understand, your Honor, that where the air compressor is small in capacity and you want to use a considerable amount of air, you use a receiver. It is nothing but a boiler to store your air up. That acts as a reservoir. That has say 1,000 cubic feet of air under a pressure of thirty-five, forty-five or fifty pounds, whatever you may use, whereas the capacity of your compressor might be only as high as 100 cubic feet. In other words, it acts as a reservoir.

This portion marked (1) air inlet led from the air receiver so that as soon as the valve A was opened, the air which was in the receiver was shot through the pipe and through the opening marked 4. The connection back from the receiver through the air inlet from the compressor, we will mark that No. 10. The valve B in the pipe 10 was opened as soon as possible after valve A was opened.

[fol. 54] Q. 26. Do I understand then that you first put pressure above the mix in the receptacle and then later opened the valve B through the length of the pipe No. 9, to where you desired to place it?

A. Oh, yes. You had to do that. If you did not do that why your air from the air inlet and opening marked 12 would just blow a hole in your discharge pipe.

Q. 27. What date did you use this pneumatic conveyer?

A. That was in 1900.

Q. 28. And where?

A. At a place which we called Black Rock near Watertown, New York.

Q. 29. Was it used successfully?

A. Yes, no question about it. It answered our purpose.

Q. 30. Now, as I understand it, you used only grout?

A. Yes, sir.

Q. 31. Is that right?

A. Yes, sir.

Q. 32. Now, does grout have gravel or stones in it?

A. It has small stones in it, yes.

Q. 33. About what size?

A. Well, with us—I have got to always refer to my own experience. We have a different sizes of sands. In some places the sand is very fine, in others very coarse. For instance here you get a river sand with not so many stones as you get in Chicago, in what we call torpedo sand. Torpedo sand was named because it had small stones in it like the toy torpedoes. Now, your stones will run from infinitesimal size—and we have got it pretty well settled wherever torpedo sand is used—it runs up to a half inch and a quarter of an inch. It is also called pea gravel, when the sand is screened out.

Q. 34. How do you fix the time as being 1900, is that it?

A. 1900.

[fol. 55] Q. 35. How do you fix that date?

A. That was the only date I was over in Watertown, and I fix it because of the fact that I had considerable difficulty getting life insurance on account of a physical condition. My policy was issued on January 9th, 1901, and I received it after I had left Watertown, and I have never been back there since.

Q. 36. You made the application before you left Watertown?

A. Oh, yes.

Q. 37. Of course, I mean the application for your insurance, and no other form of application?

A. Yes, my last examination was just a couple of days before Christmas.

Q. 38. Now, have you had any other experience with pneumatic placing of concrete or grout?

A. In this way, yes. After I left Watertown I was engaged by the Sanitary District of Chicago, and George W. Jackson was a very prominent contractor there. Jackson and I were pretty good friends, and he was, if I may be a little bit crude, he was a bug on new methods or new applications of old methods to anything which would help him on his concrete work.

I mentioned to Jackson the fact that I had used or developed this machine for placing grout. I might say, your Honor, that I have always been particularly interested in tunnel work, and Mr. Jackson was doing an enormous amount of tunnel work at that time.

I do not know whether you are familiar or not with tunnel work, but in placing concrete along the invert or bottoms and the sides of a tunnel it is a very easy matter to place the concrete, but when you get up into the arch, the [fol. 56] keying in, which may or may not be in the form of a key stone, anyhow it is the place where you have to put your concrete in the top of the arch, that is a different propos-tion, and it is very important that the concrete be placed in there as solidly as possible.

Jackson had tried, after he had been down in this Illinois tunnel which he had under construction for a long time, he had tried various ways of putting his concrete up in there with rammers, pushing the stuff back, and it at first being more or less ready to begin to come out, and it was always at the top where the concrete would not stay.

It struck me that this or some adaptation of this machine would be just the ideal for placing what we call the key concrete or the arch concrete. I spoke to Jackson about it, and he took me over afterwards, or asked me to come over, and I went, to what we always called his job, where he showed me a machine. I sketched this out some time ago like this. This figure No. 2 of Exhibit E——

Q. 39. The lower portion of the exhibit. Will you describe it and letter it as you go along?

A. This middle portion labelled A was an iron cylinder. The part labelled No. 15 was an iron plate. The part

labelled I was a piece of cast iron reducer. The part labelled D was an iron pipe.

By the Court:

Q. 40. Where is the part labelled I?

A. Down here, sir.

Q. 41. I thought you said it was a cast iron reducer?

A. That is what we call it, your Honor. Like this glass [fol. 57] (indicating). This is a certain size but we want to bring it to a smaller size here so that this casting can be placed.

By Mr. Johnson:

Q. 42. In other words, change the casting?

A. It is nothing but a funnel.

By the Court:

Q. 43. It is an inverted truncated cone?

A. Yes, as we would say, nothing but a funnel. The part labelled H was the outlet or discharge pipe. The part labelled G was the connection from the lower portion of the machine to the outlet pipe H. E was a valve in the pipe leading directly to pipe J. Pipe F led to pipe J. C is a valve in the pipe D, and B was the cover for inserting the material into the machine. Pipe J led to the compressed air receiver.

When I saw this machine operated the materials were in this case concrete materials, that is when I say concrete materials, I differentiate between concrete and grout, meaning that the coarse aggregate was larger than a quarter of an inch, that is it was stone running up to an inch and an inch and a half. The concrete materials were mixed on the floor and deposited through the opening of which B is the cover, and that placed the materials directly into the machine. The valve C was opened, followed immediately afterwards by the opening of the valve E, and concrete was discharged through this neck G, and through the discharge [fol. 58] pipe H and deposited in the making of a concrete floor and underpinning, a small portion of the brick wall which was in this building.

By Mr. Johnson:

Q. 44. If I understand your testimony correctly, you saw a machine, built like this figure 2 on Exhibit E, convey concrete pneumatically, is that right?

A. Yes, sir.

Q. 45. And where was that?

A. That was in what we called the Jackson Shop on Adams Street. The number was 177 East Adams Street at that time.

Q. 46. When was that?

A. That was in 1903.

Q. 47. How do you place the date as 1903?

A. Well, if you are going to ask me that, I am going to get personal. I was married in 1904 and this shop happened to be on the way where I could walk home and also meet my prospective wife.

Now, when I walked in there and walked along—I do not think I said this before—this discharge pipe was not a straight pipe. It came out and for a ways went up over some other machinery and came down dropping and had a bag around it with a kind of curtain, and the material was dropped down into a box.

Now, as I said this was personal. I got too close to it and I was considerably splashed with concrete material, consequently I could not meet my lady friend that night.

Q. 48. Why was it necessary to drape a bag or baffle plate over the end of the discharge pipe?

A. If they did not do that the material came out with such force it just splashed over everything.

[fol. 59] By the Court:

Q. 49. Where was the bag?

A. May I picture it to your Honor? You know how an ordinary water tank for a locomotive comes down and you know they have a bag or a steel plate just like a bag right at the end to keep the water from splashing out of the receiver. This bag was right at the end of that pipe.

Q. 50. Where was it on this figure 2——

A. If I may carry this out a litte bit it was roughly like this (indicating) being a continuation of the tube.

By Mr. Johnson:

Q. 51. Was this bend higher than the receptacle or not?

A. Yes, it was.

Q. 52. Well then, break the line.

A. All right (witness does as requested).

The reason I said it was because the discharge pipe was hung along on the rafters, the ceiling rafters, while this was plenty low enough for a man to shovel the material from the ground up into this. The bag of which your Honor asked was hung at the point No. 16 on the continuation of the pipe labelled H.

Q. 53. Give the bag a number.

A. 17.

Q. 54. Are you through, Mr. Artingstall?

A. Unless there is something I have not made clear.

Q. 55. What air pressure did you use in this pneumatic concrete conveyer, Figure 2, Exhibit E?

A. That I could not state positively, as to what the pressure was there. Jackson was using air pressure for various [fol. 60] purposes, and he may have connected onto a 35-pound line or a 60-pound line. All I can say is that whatever pressure was used was sufficient to send the material out of the machine into the pipe H and splash considerable when it came out at the other end of the pipe.

Q. 56. When you saw this machine operating in 1903 was it being used for any particular purpose?

A. At the time he laid concrete floor in this building, No. 177.

Q. 57. What street?

A. Adams Street, East Adams Street.

Q. 58. Chicago, Illinois?

A. Chicago, Illinois.

Q. 59. Will you please state about what was the size of the opening that I have designated "18"?

A. That was as near as I can recollect about a 2-inch pipe, not any smaller. Two inches or two inches and a half.

Q. 60. And how large was the portion that I am marking "19"?

A. That was a four or six-inch. I am inclined to believe that it was a 6-ich, for this reason: at that time we put a couple of cement bags in the machine. Now, a cement bag

is a rather bulky proposition to force into a 4-inch pipe, which was rather a small pipe, and this would lead me to believe that I could without much question cross that 4-inch out and say it was a 6-inch.

Q. 61. What was the diameter of the discharge pipe?

A. That was a 6-inch pipe; that was a spiral riveted pipe.

Q. 62. What was the diameter of the air pipe F?

A. These were, both F and J were 2 or 2½ inches.

[fol. 61] Q. 63. In describing the operation of this pneumatic air blower, I think you omitted to state just exactly what you did with the cover B after the materials were placed in the vessel A.

A. That may look peculiar, Mr. Johnson. That cover B is on the top of the pipe while the air pressure is at the bottom. As a matter of fact, there were some stud bolts on here; that had to be bolted down after it was taken off. The cover B had to be bolted down after it was taken off.

Q. 64. Can you make stud bolts on that?

A. They are nothing but a bolt that comes in here (indicating). I call these stud bolts. I do not know whether they were stud bolts, may be they were a bolt that went through with another nut at that point. That was immaterial so far as this was concerned.

Mr. Morgan: Refer them up.

The Witness: That would be No. 20; bolts, No. 20.

Q. 65. Then as I understand your testimony after you put the sand, cement, water and gravel in the vessel A you clamped down the cover B before turning the air on, is that right?

A. Understand on this machine, Mr. Johnson, I was a spectator. Jackson asked me over to see how it worked, and his men did all the work.

So your question would be answered yes: His men as soon as they clamped down the cover B, turned the valve C, then the valve E almost instantaneously.

Q. 66. Did you see them use stone or gravel in this concrete that was blown from the vessel A in 1903?

[fol. 62] A. Jackson at that time was a great believer in gravel concrete. When I say gravel, I do not mean small gravel. I mean gravel, crushed gravel, that would run up to the same size or practically so as the crushed stone, and that would run to an inch or an inch and a half in diameter.

Q. 67. A moment ago you spoke of Mr. Jackson's men. Can you recall the name of any one of his men that were working or superintending that job at that time?

A. Mr. John T. Fanning was very intimately connected with it.

Q. 68. Is Mr. Fanning in the courtroom?

A. Yes, sir.

Q. 69. Is Mr. Jackson alive?

A. Mr. Jackson is dead.

Q. 70. How far did you blow the concrete from this pneumatic concrete conveyer?

A. That was about fifty feet.

Q. 71. About fifty feet?

A. About fifty, yes.

Q. 72. Could you have blown it any farther if it was necessary to do so?

Mr. Cox: I object to that as a matter of opinion. The witness has testified to certain facts, supposed to be facts.

Mr. Johnson: He is also qualified as an engineer, your Honor.

The Court: Overruled.

A. There is no question but what it could have been forced a great deal farther from the very fact that it came out from the end of the pipe with such force that they said to droop a baffle bag over it and let the material drop into a box at the bottom to keep it from splashing over. I do [fol. 63] not mean to say a box at the bottom; a box underneath the end of the bag 17.

Q. 73. I will ask you as an engineer if you had the proper pressure could you with this machine that you saw operate in 1903 blow concrete pneumatically several thousand feet?

A. Well, there is no question but that you can blow it, but whether it is economical or not is another question.

What I mean to say is this: The distance which material may be transported pneumatically depends on the capacity of your compressors, and on the unit pressure per square inch. Now, that is general. The only other factor is the friction in the discharge pipe itself. If all of those things are *pro*portioned correctly, there is no question at all but what you can discharge it as far as you want.

Q. 74. Did I understand that Jackson was using this identical machine in laying a floor and also underpinning, a commercial proposition?

A. Yes, sir, this was his own building.

Q. 75. His own building?

A. Yes, sir.

Mr. Morgan: Where was that?

The Witness: 177 East Adams Street.

Q. 76. You saw Mr. John T. Fanning, who is in the court room, operate that machine at that time, is that right?

A. Fanning did not operate it at that time. Fanning was there. A common laborer was doing the dirty work.

Q. 77. I mean Mr. Fanning was superintendent: was he or was he not?

A. Mr. Fanning was connected with George W. Jackson as an engineer at that time.

[fol. 64] Q. 78. And you saw him there while this machine was being used commercially to lay a concrete floor and underpinning in 1903?

A. I will not say that he was there at that particular time, for this reason, Mr. Johnson: Mr. Jackson and Fanning and I were pretty good friends for a great many years. We might have met on a certain day to go over to that same shop to see something entirely different. Jackson had various machines, so I cannot say that Fanning was with us at this particular time that I went over to see this particular machine.

Q. 79. But you know that Mr. Fanning was connected with the Jackson Company at the same time that this machine was used commercially in 1903?

A. Oh, yes.

Mr. Johnson: I offer Exhibit E for identification in evidence.

(Marked Defendants' Exhibit E.)

Q. 80. Are you a member of the Western Society of Engineers?

A. I am.

Q. 81. Do you know Mr. H. B. Kirkland who is present in the courtroom?

A. I do.

Q. 82. Were you ever present at a meeting of the Western Society of Engineers when he read a paper on the pneumatic method of concreting?

A. I was.

Q. 83. "Pneumatic Method of Concreting" stated to be covered by this patent in suit?

A. I was.

Q. 84. What is the practice of you engineers? After the article is read, do you discuss it or not?

A. Yes, generally the author who is to present a paper [fol. 65] if it has not been printed in advance, he often sends out typewritten copies—or he gives them to whomsoever he may think is qualified to discuss his paper and asks them to be present at the meeting—well, to be frank, so as his paper will not fall flat for the want of discussion.

Q. 85. Are those articles printed in the journal of the Western Society of Engineers?

A. A great many of them are.

Q. 86. Would you recognize this article that you heard Mr. Kirkland read if you saw it?

A. I would.

Q. 87. I call your attention to the journal of the Western Society of Engineers for May, 1918, Volume XXIII, No. 5, an article entitled "Pneumatic Method of Concreting" by H. B. Kirkland, M. W. S. E., presented May 13th, 1918, and appearing on pages 319 to 355 of that journal (handing paper to witness).

A. Yes, sir.

Q. 88. You just said you were present there?

A. Yes, I was present.

Q. 89. I notice in the discussion of that article some remarks by Mr. William Artingstall, is that yourself?

A. That is myself, yes.

Q. 90. I call your attention more particularly to your remarks appearing in that article, or in the discussion of that article, printed on page 353 of that journal of the Western Society of Engineers, and ask that you kindly read into the record the portion that I have marked?

A. Do you mean for me to read my discussion on that date?

Q. 91. Just that which is marked. I do not want the whole thing.

A. This is a discussion by myself on the paper which [fol. 66] Mr. Johnson spoke of. It reads as follows: "The development——

Mr. Morgan: I suggest that you read it as it appears so that it will be clear for the record.

The Witness: "Mr Wm. Artingstall: The development of the pneumatic mixer is interesting. About fifteen years ago this device was used in connection with an ordinary mixer as a transporting agent. The concrete was dumped into the hopper and transported by air pressure. The contractor, however, put something over on the engineers. He ran a batch or two through the hopper without putting it through the mixer, and discovered that he had a pretty good mix. From that time on it was dropped until about 1907 or 1908, when the Drake Machine Company, here in Chicago, took it up and started to improve it. We tried it out in the LaSalle Street Tunnel. I think that was the first time it was used after 1903. We made some tests on the concrete, and, as I recollect it now, the ordinary concrete running in a six to twelve-inch tube, withstood a pressure of about 1,900 pounds. We used pressures of about 2,300 to 2,700 pounds on some forty or fifty different tests. We used this system on account of the convenience more than anything else, but we found we had the best concrete, and we used it practically everywhere we could after that. I think you will find that if the mixers of the present time [fol. 67] compare with the ones used at that time, the work will compare favorably with the ordinary mixed concrete work."

Q. 92. Now, when did you make that comment, at the discussion of this article by the chief engineer of the plaintiff company?

A. That discussion was made——

Mr. Cox: I, of course, object to any statements in that article which are not within the personal knowledge of the

witness, and if so made, as hearsay, such as what the contractor did.

I understand that this article and his statements are simply being introduced to show that this witness made such a statement at that time, and not as evidence of the facts stated therein.

Mr. Johnson: Oh, yes.

Mr. Cox: All right.

Q. 93. Now, if you will tell the date, the date please, Mr. Artingstall, when you made that statement in this connection.

A. This was my oral discussion of Mr. Kirkland's paper, "The Pneumatic Method of Concreting," the same evening at which it was presented, May 13th, 1918. It was presented at the Western Society of Engineers.

Q. 94. Now, fifteen years prior to May 13th, 1918, would be what?

A. 1903.

Q. 95. Now, all through this article and also through this discussion that I have just mentioned Mr. Kirkland [fol. 68] and yourself differentiated between the mixer and the pneumatic transporting agent. Why was that? Why should you differentiate between the mixer and the transporting agent?

A. Well, there are a dozen different kinds of mixers. You can mix concrete with an ordinary shovel, but it is a very difficult proposition to transport it 50 feet or 100 feet or 1,000 feet on the shovel.

In other words, the proposition with one is getting it in the place where you want it to remain, whether that be in a tunnel, or a retaining wall or a seawall, wherever it may be.

Q. 96. What did you mean by differentiating between the two, that is, between the mixer and the pneumatic transporting agent?

A. Yes, that was just what I pointed out to you in answer to those two questions there, what we want is to get the material into a certain place, and there was only one way to get it there and that was to force it in.

Q. 97. By what?

A. The best way to force it in was by air.

Q. 98. In this article——

A. I might say, if I may expound a little bit. You wonder why I say air instead of steam, because steam will cause the setting of the concrete almost instantaneously. In some cases we have had concrete put in carriages with steam turned on it, and it would set within a very few moments, so that we finally had to dump the stuff out before we got it to the place. That was the reason we use air.

Q. 99. In this article when you stated, "About fifteen years ago this device was used in connection with an ordi- [fol. 69] nary mixer as a transporting agent, what did you have in mind at that time?

A. The mixers spoken of here or the machine spoken of here was used as a transporting agent not primarily as a mixer. That is, as I said, in the Jackson machine, the material was mixed on the floor, by ordinary labor and thrown up with shovels into the hopper and transported by being carried through this pipe and over or across other machines which happened to be in the shop to the place where they wanted to put it.

Q. 100. In your last answer and one or two of the others you have referred to these machines on exhibit E. Why do you refer to this machine here, figure 2 of exhibit E, as a transporting agent?

A. Well, because that is what it was used for.

Q. 101. Was that the one you had in mind that was stated "about fifteen years ago"?

A. Yes, sir.

Mr. Johnson: The Journal of the Western Society of Engineers, May, 1918, Volume 23, No. 5, copyrighted in 1918 by the Western Society of Engineers, is offered in evidence as Defendant's Exhibit F.

Mr. Cox: The whole journal?

Mr. Johnson: Well, no, just a portion of it if you wish me to designate it.

Mr. Cox: What portion of it are you referring to?

Mr. Johnson: That is, I am offering the article and the front cover, covering the article entitled, "The Pneumatic Method of Concreting," by Mr. H. W. Kirkland, M. W.

[fol. 70] S. E., presented May 13, 1918, and the discussion thereof running from page 319 through page 355.

Mr. Cox: I object to anything except the statement of the witness here. I do not know the rest of it. As I understand it, this witness has been simply asked to prove that he made a certain statement. Now, if the rest of the article is to be put in evidence it ought to be proven and its relevancy shown.

Mr. Johnson: I have proven the fact that the paper was read at this meeting by this witness. He was there and he discussed it.

I can undertake to show the relevancy of it in the arguments. It is a matter of argument, but I will argue it now if your Honor so desires. It contradicts everything they have.

Mr. Cox: It is not relevant if it is being offered as a statement made by Mr. Kirkland. He is here and can be asked about it.

Mr. Johnson: This man was present during the reading of that article, he heard it delivered and discussed it.

The Court: What are you trying to prove by it?

Mr. Johnson: I am first trying to prove that this statement was not simply an afterthought by Mr. Artingstall, and that there is documentary evidence that in 1918 Mr. Artingstall said that this pneumatic method of conveying concrete was old fifteen years before that.

That is the first thing. That shows that in this discus-[fol. 71] sion of this article he stated it was old in 1903. He established that. The whole article is necessary to show just exactly what Artingstall was talking about.

The article is on mixers and is given by the chief engineer and vice president of the plaintiff company, and, as a matter of fact, it deals all the way through with their structure which contradicts their present contention.

The Court: I think I will allow it.

Mr. Cox: May I say here this is supposed to be a statement made by Mr. Kirkland, and Mr. Kirkland is present and if they want to prove that statement they ought to call him as a witness.

The Court: I think that is true.

Mr. Johnson: I will offer it as prima facie proof and if they want to deny it they can call him.

Mr. Cox: I will object to it.

The Court: I do not see how you can offer this strictly except to refresh his recollection in order to show some date or something.

Mr. Johnson: Well, it does show the date, sir. It was printed and the paper was given in May 13th, 1918, and it was printed in May, 1918.

The Court: Do you wish to confirm what Mr. Kirkland is going to testify to?

Mr. Johnson: It contradicts what he is going to testify to.

Mr. Cox: Mr. Kirkland has not been called as a witness yet.

[fol. 72] Mr. Johnson: We have an opportunity to do so.

The Court: I will sustain the objection.

Mr. Johnson: Exception.

I would like, if I may, your Honor——

Mr. Cox: I do not object to what Mr. Artingstall said, if you want to put in that statement, I have no objection at all.

Mr. Johnson: He made that statement. Is it your position, your Honor, that I should call Mr. Kirkland for the purpose of proving this article? That copy is certified by that society.

The Court: This article states a lot of facts, as I understand it. Why should this witness be called to prove this article?

Mr. Johnson: Well, he heard it.

The Court: Why do not you call the man that wrote it?

Mr. Johnson: I do not know that I will have an opportunity.

Mr. Cox: He is here.

Mr. Johnson: But I need it very much. It is very material to our defense, and if they will produce him and keep him here I am perfectly willing to call him for its introduction.

Mr. Cox: We will keep him here.

The Court: They say they will keep him here.

Mr. Johnson: All right.

Q. 102. Did you ever know John McMichael, the patentee of the patent in suit?

A. Yes, I did.

[fol. 73] Q. 103. In what years?

A. I met McMichael and knew him best about 1910 or 1911.

Q. 104. Did he ever consult with you as to any pneumatic conveying mechanisms in 1911?

A. We were constructing the La Salle Street tunnel. McMichael wanted to introduce his conveying apparatus to the contractors at that time. I was engineer of design and in charge of the work for the street railway company, and both supervisor and engineer.

The machine was made in the Drake Machine Company plant, and there was considerable trouble in getting the thing onto the job and getting it started and one thing or another. My interest was to get the work through, so I gave all the help I could to both the contractors and to McMichael, whoever asked me to go over there first, I do not know, but I went over there and gave them whatever help and information I could to get the machine onto the job.

Q. 105. Do you know about when McMichael built his first concrete mixer?

A. Well, I do not know when he built the first one. The first one that I ever saw was in 1911. This one I was just speaking of, having been used on the La Salle Street tunnel.

Q. 106. Have you got a photograph of that?

A. I have it in that pamphlet there, Mr. Johnson.

Q. 107. (Handing paper to witness.)

A. Yes, that is it.

Q. 108. You have a photograph? A. Yes, I have a photograph.

Q. 109. When was this photograph taken, about?

A. This was taken in 1911, along in the fall.

Q. 110. I notice that in this photograph is a picture of a [fol. 74] man, do you know who he is?

A. He was one of my inspectors, by the name of Coombs.

The Court: Are you going to mark that?

Mr. Johnson: Yes, sir, Exhibit G. I offer this in evidence.

Mr. Cox: May I ask for what purpose this is offered? This photograph was taken some four years or more after the filing of the application for the patent in suit, and it does not seem to me to be relevant.

Mr. Johnson: It shows the construction different from that illustrated in the patent in this form, and the questions I now ask show the relevancy.

The Court: All right.

(Marked Defendants' Exhibit F.)

Q. 111. Did you see this machine operate?

A. Oh, yes, many times.

Q. 112. Will you briefly describe how it did operate?

A. The operation, at the upper part is a hopper which I am going to call H, which is practically at street level. There is a large valve immediately below that which I will call K. The machine itself was composed of three different sections, which I am going to call M, that is, there is the center portion, an upper portion and the reducing portion.

At the lower portion of the machine (M) is the bend leading to the discharge pipe and in fact is a portion of the discharge pipe which I am going to call P. Off to the right in the upper section above the flange is a small pipe [fol. 75] with a valve on it, and the pipe and the valve I am going to call No. 1, which is a litle bit farther to the right of that which is a Y connected with a pipe leading down toward the foot of the machine connecting it to another Y, and this returning through a pipe to the air line. I will call the whole business No. 3.

Now, the materials were put in at street level into the hopper up in here, and the valve——

By the Court:

Q. 113. Where is that? This is the hopper?

A. The materials were put into this hopper, then valve K was opened, the materials dropped into the machine M, and the valve L, leading into the top of the machine and the other one leading down into the discharge pipe, were opened, almost simultaneously as near as could be done; the material was then discharged through the pipe P down under the pipe on which the young man is sitting, down into the tunnel and to the place where the material was to be dumped.

By Mr. Johnson:

Q. 114. What was the consistency of the concrete that was blown out of that machine as shown by the photograph, Exhibit F?

A. That was a pretty wet mixture, pretty wet. It was all concrete mixture. My specifications on all this tunnel work ran on the river section, 1, 2 and 4; that is, one part cement, two parts of sand and four parts of stone, not to exceed one [fol. 76] or one and a half inches in diameter.

Q. 115. Did you make any suggestions in the building of this commercial machine?

A. We had a lot of trouble. There was considerable trouble on this, and the material instead of, when they opened that valve K—let me put it this way: before the elbow of the pipe P was made of cast iron, they used a spiral rivetted pipe. Now, when the material came down through the valve K and the air pipe No. 1 leading into the top of the mixer it was turned up, there was considerable clogging of material in this lower portion of the elbow P; and I suggested to McMichael that he could get rid of that by putting a connection down here at the lower end of his pipe by inserting a connection down near the elbow. That is shown in here. That is the connection coming down through here (indicating), No. 2.

Mr. Cox: McMichael is dead and his application for a patent was on file more than four years prior to this and speaks for itself. At least it is incompetent, irrelevant and immaterial.

The Court: Overruled.

Q. 116. Do I understand, then, Mr. Artingstall, that McMichael attempted to build a machine like the drawings of his patent with air coming down and the air pipes (2) coming down as shown in the figure of his drawing, but that that was not satisfactory?

Mr. Cox: I object to this. This witness says that he does not know when McMichael built his first machine, and naturally he does not know how many machines McMichael [fol. 77] built. It is highly irrelevant to the issues in this case.

Mr. Johnson: This witness is testifying to his personal knowledge. This machine right here in 1911 was clogged up and was unsatisfactory.

Mr. Cox: It is entirely irrelevant and immaterial. It would not have made any appreciable difference if he changed his patent construction.

Mr. Johnson: His patent application is inoperative as filed.

Mr. Cox: That is another question. This thing here varies from the patent in various particulars.

The Court: Overruled.

Q. 117. Go ahead.

A. Read the question and answer, please.

(Question and answer read.)

A. The trouble we found with that pipe 2 coming in there was that the air blew a hole through the material.

Q. 118. That is through the concrete?

A. Through the concrete material. In other words, the air exhausted through pipe 2 and out through his discharge pipe 23 lifted the material up above your arch over bend.

Q. 119. You made a suggestion then. What was your suggestion?

A. My suggestion was he put the connection down at the lower portion of his bend as shown in this photograph, marked as No. 2.

Q. 120. And that was in 1911?

A. 1911, yes, sir.

(Adjourned to Tuesday, October 5th, 1926, at 10:45 o'clock A. M.)

[fol. 78] WILLIAM ARTINGSTALL resumed:

Direct examination.

By Mr. Johnson (continued):

Q. 120. Mr. Artingstall, yesterday in your testimony you referred to seeing this concrete blower, figure No. 2 on Defendants' Exhibit No. E, at 177 Adam Street; was that correct?

A. No, it is Monroe Street. It should be Monroe Street. If I said "Adam", I am mistaken.

Q. 121. Throughout your testimony, you mean Monroe Street?

A. I meant Monroe Street, yes, sir.

Q. 122. In referring to this concrete blower that you saw operated on that job for laying a floor and also for underpinning on Monroe Street in 1903——

A. Yes, sir.

Q. 123. Your testimony stated that the force of the concrete coming out through this exit pipe was so great that it splashed, and you had to have a baffle bag; is that correct?

A. Yes, sir.

Q. 124. About what was the consistency of the concrete that you saw coming out of this exit pipe H?

A. It was very wet, quite wet. I would say that you could compare it—if a man had stood on it, he would probably sink half way up to his knees.

Q. 125. Elsewhere in your affidavit you referred to the consistency of cream. Was it about like that?

A. Yes, just about the same, but, of course, having the stone in, a layman would probably say it was slush.

Q. 126. That is, very wet concrete?

A. Very wet, yes.

[fol. 79] Q. 127. In examining the operation of this machine, Exhibit No. 2, in 1903, did any slugs of concrete come out through the exit pipe H, or sections of concrete or segments of concrete, or how did they come out?

A. No, that concrete is carried along as a floating mass, and it just comes out in the one mass. In other words, the floatation mixture is carried. There are no slugs.

Q. 128. There are no slugs of concrete or sections of concrete segments of concrete; is that right?

A. No, I never saw any.

Q. 129. You mentioned a minute ago about coming out by flotation. What did you mean by that?

A. When the air is turned into the concrete mixer, that is not only forced through and into the mixture, but carries the concrete mixture along with it. That is, it could be called an emulsification. The air is surrounding the individual portions of the concrete or certain parts of it, to lay around the stones. In other words, there is a continual

mixing through there, mixing with the air as well as with itself.

Q. 130. Is the air carrying it?

A. There is no question about that.

Q. 131. The air is floating it?

A. The air is floating it right along. If that was not so, if the concrete was carried along as a slug, there is no question at all but what the friction on the outside of the pipe, on each one of those slugs, would so retard it that the middle would be pushed ahead.

In other words, it would be broken up. The middle would then become the outside, and there would be a kind of whirling in and out motion, so there could not possibly be any [fol. 80] such thing as a slug.

Q. 132. Is that also true of a segment of concrete or a section of concrete?

A. I do not get that.

Q. 133. You just mentioned that slugs of concrete could not come out through this pipe H. I am asking you now if that action of yours applies also to sections of concrete, cylinders of concrete or segments of concrete, like a piston going through there, a piston of concrete.

A. I can not see that there is any possibility of shoving the piston of concrete through there, through the pipe.

Q. 134. I call your attention to Defendants' Exhibit F, which is a photograph of the McMichael blower, and ask you did you see that in operation?

A. I did, yes.

Q. 135. When?

A. In 1911.

Q. 136. With what sort of concrete was it employed, wet or dry?

A. It was a wet concrete.

Q. 137. Were there any slugs of concrete that came out of the exit pipe there?

A. Not that I ever saw.

Q. 138. How did it come out?

A. It just came out—possibly, I can picture it this way: If you can imagine a water faucet; giving it a quick turn, your water is coming slushing out of the faucet. You turn it off. That ends it except for the little bit that comes along

through the faucet itself. That is as near as I can picture it for a layman.

Q. 139. In this Journal of the Western Society of Engineers, page 353, marked for Identification as Defendants' [fol. 81] Exhibit F, I note that in your remarks you referred to certain pressures of 1,900 pounds and 2,300 pounds and 2,700 pounds. Did that have any relation to the air pressure in the pipe?

A. No, that has nothing to do with the air pressure at all. That merely referred to tests which we made on the concrete.

Q. 140. How do you make those tests?

A. On that particular job of which I was speaking there, we were continuously making what we call a full-sized tests; that is, blocks of concrete six inches or twelve inches cube, and we would take these cubes or forms, which are nothing but a box twelve inches each way, put that directly under the mixing and take the concrete right from the spout, so that we would get an absolutely exact mixture, the same kind and consistency that was going into the concrete. Then that was carried off to one side as close as possible to where that particular concrete was being used that day, so that the conditions of the test would simulate as nearly as possible actual conditions in the work. That is all those 1,800 and 2,200 pounds have reference to.

Q. 141. In your testimony yesterday, you referred to the relative costs of placing concrete by a pneumatic blower such as figure No. 2, Exhibit 3, and also Exhibit No. F. With relation to placing it by hand, what have you to say about that?

A. Concrete can be placed in a great number of different ways. In my experience where we used this, the only job of mine in which I could talk knowing what I was talking about, was that of the South Street Tunnel, but we found [fol. 82] that the cost of the concrete, as transported by this air mixer, exceeded the cost of transportating it by buggy, which is nothing but an ordinary wheel barrow, you might say a half barrel shape, and the material dumped into that and wheeled into place. We used this because of the inaccessibility of getting the concrete into the upper part of the arch. Where we used buggies, we would have to load them, take them down into the tunnel a distance

of about thirty feet, carry them along on a runway 100 to 150 feet, dump the material and then shove it back. In this way, we got out of practically two handlings.

Q. 142. Would the cost of operation figure in which method was used?

A. Yes, with a contractor more so than with an engineer. As an engineer, I do not care particularly how much a contractor is going to spend on his work as long as he is going to have money enough to carry my job through. The contractor has got to look at it from the other side of the fence.

Q. 143. Do you know of any instance where the buggy or hand placing superseded the pneumatic placing of the McMichael Blower, as Exhibit F?

A. Yes; on that same job we had that machine installed, but we found it cheaper to place the concrete in the lower part of the arch by means of these buggies and then place it again from the regular mixers to this air mixer and transported the concrete for the upper section by means of this air conveyor.

Q. 144. Then the contractor would use whichever method was the cheaper; is that it?

A. Yes.

Q. 145. I call your attention to the McIlvrid Patent, [fol. 83] No. 958,421, and ask you to examine the drawings and the specifications of the patent, and ask you whether or not you ever used the concrete or grout blower shown in that patent (handing paper to witness)?

A. Yes, I have used that.

Q. 146. When did you use that?

A. That was used late in 1911.

Q. 147. Who manufactured the device?

A. The name plate on that was the Cockburn.

Q. 148. What materials did you use?

A. That was a cement and sand and water, we called it a grout, very thin. We had no stones in it.

Q. 149. Did you have any small gravel in it?

A. No. I might say this, in explaining our use of that. We used it for the stoppage of leaks. The tunnel is under the Chicago River, and there is 27 feet of water over the top of it. From the top or surface of the water from where we were stopping the leaks was about 50 feet, quite a good

deal of pressure, and the amount of water coming through the concrete, of course, would add to the increased cost of operation of this tunnel. We desired to prevent as much water coming in as possible, and had one inch or one and a half inches and in some cases two inch pipes put back into the concrete. We then forced grout through these various sized pipes. So you see we had to have it very, very thin. In some cases, we used only water and cement.

Q. 150. Your recollection is that you did or did not use any pebbles in that grout?

A. No, I do not think that we used any pebbles at all.

[fol. 84] By the Court:

Q. 151. Do I understand you to testify that you used this device that is described?

A. This Cockburn, yes, sir.

Q. 152. What year?

A. That was in 1911.

Mr. Johnson: That was before the patent in suit.

By Mr. Johnson:

Q. 153. From your practical experience in handling a machine built under this McIlvrid Patent, 958,421, and the fact that the patent says that small stone may be used to build sea-walls and foundations and so forth, what would be your opinion; would that be wet concrete or not?

Mr. Cox: I object to that. That is simply asking for an opinion and a conclusion.

Mr. Johnson: He used the machine, your Honor, and he is a very capable engineer right in this line of business. The patent says that small stones may be used to build sea-walls and foundations. You would not make that out of grout. When you strengthen that with small stones, you get concrete. This man filed his application before McMichael filed his in the Patent Office.

The Court: I will sustain the objection to the question in that form. If you want to ask him some scientific ques-
[fol. 85] tion, you may do so, but you are asking him to construe the language of the patent, as I understand you.

Q. 154. Could the machine from your experience as an engineer familiar with concrete construction, could the machine shown in this McIlvrid Patent be used to blow wet concrete?

A. Oh, yes.

Mr. Cox: I make the same objection to that.

The Court: Objection overruled.

Mr. Cox: Exception.

The Witness: If I may make a statement, I think it would probably clear up my answer as to the possibility of using gravel in that Cockburn mixer. When I asked for the proceeding of the Western Society of Engineers, I was under the impression that there was a certain photograph in there which was taken under my direction. At that time we had considerable leakage in the Van Buren Street Tunnel, which is also a street railway tunnel under the Chicago River and under the same conditions which I described a few moments ago. The Great Lakes Dredge & Dock Company who had that contract, did not use the Cockburn mixer, but we took the same kind of mixer as is shown on the upper section of that Exhibit E there, as I described yesterday, using a cast iron water main, flanged pipe, and in that case we had one very difficult place or condition where [fol. 86] the pumps came down the shaft and an enormous amount of water came down. We could not possibly fill that hole up with grout, so there we made a special effort and actually shifted torpedoes there and finally got roofing gravel to use in that, call it grout machine or anything you want, that first design there on the Exhibit E.

Q. 155. When was that?

A. That was late in 1907.

Q. 156. Did you ever read a paper before the Western Society of Engineers describing the operation by you of a machine built in accordance with the McIlvrid Patent, No. 958,221?

A. That is manufactured by the Cockburn Company?

Q. 157. Yes.

A. Yes, sir, I did.

Q. 158. Please refer to it.

A. That is in the Journal of the Western Society of Engineers, Volume 16, No. 9, November, 1911, page 917, which

covers a portion of the discussion of my paper entitled, "The Chicago River Tunnels."

Q. 159. What you just referred to is a portion of an article written by you entitled, "Chicago River Tunnels, Their History and Method of Reconstruction," appearing on pages 869 to 921, is it not?

A. Yes, sir.

Q. 160. When was that article printed and published?

A. That was published in Volume 16, No. 9, November, 1911.

Mr. Johnson: I offer in evidence the Journal of the [fol. 87] Western Society of Engineers of November, 1911, Volume 16, No. 9, copyrighted 1911 by the Western Society of Engineers, and more particularly page 917 of the certain article just referred to by the witness.

Mr. Cox: I object to this offer. This is an article said to have been written by this witness in 1911, nearly five years after the application for the patent in suit.

The Court: What do you want that for?

Mr. Johnson: It is documentary evidence and corroborative testimony that he used this device in 1911; and that this patent is not a paper patent; that is, that machines were actually built under it and used.

The Court: How long was the article written before this suit was brought?

Mr. Johnson: Fifteen years.

The Court: I will let you put it in. I doubt if it is competent evidence. If it had been contemporaneous, I think it would be pretty poor evidence.

Mr. Cox: It is put in to corroborate the statement of the witness that he did make such statements in 1911, is that it?

Mr. Johnson: To corroborate his testimony that he used this machine in 1911, years before the suit was brought.

The Court: The article may be one that I would like to look at.

(Marked Defendants' Exhibit G.)

[fol. 88] Cross-examination.

By Mr. Cox:

X Q. 161. Mr. Artingstall, where is your office in Chicago?

A. I have two offices, one in 7 South Dearborn Street, and one in the City Hall.

X Q. 162. Your office at 7 South Dearborn Street is a real estate office, is it not?

A. No, it is not.

X Q. 163. What is the name of the firm on the door?

A. It is a suite of offices. Roe & Whitman are the holders of the lease of the suite.

X Q. 164. "Roe & Whitman, Real Estate Dealers" appears in large type at the head of the door, does it not?

A. Yes.

X Q. 165. And then there are about a dozen names in small type under that?

A. I do not think there are a dozen. There are about four, I believe. There are several of them.

X Q. 166. And yours is one of those names?

A. Yes.

X Q. 167. About how often do you go to that office?

A. Sometimes I go there every day; sometimes I do not go there for a week.

X Q. 168. You go there to meet appointments and get your mail?

A. Mostly to get mail.

X Q. 169. Just what is your connection with the City Engineer's office in Chicago. Are you employed by the City of Chicago on a salary?

A. I have no connection whatsoever with the City Engineer.

X Q. 170. Are you employed by the City on a salary?

A. Yes.

X Q. 171. Do you mind telling us what that salary is?

Mr. Johnson: I object to that, your Honor.

[fol. 89] The Court: Objection sustained. I do not see what his salary can possibly have to do with it.

X Q. 172. You have a desk in a small office in the City Hall; is that right?

A. No, I have a large office.

X Q. 173. How big is it?

A. About twenty feet square, I should judge.

X Q. 174. And there are some other men in that office?

The Court: I do not see what difference it makes whether he has a large desk in a small office or a small desk in a large office.

Mr. Cox: This witness has been telling us about his very important connections in Chicago, and I think I ought to be allowed briefly to show what they really are.

The Court: All right.

X Q. 175. There are several other gentlemen in that office with you?

A. My direct employees and assistants.

X Q. 176. How many employees or assistants have you in that office?

A. I have only one who is a real office man. The others come and go. Whether I have one or a dozen, it does not make much difference. That is, what I mean to say, Mr. Cox, is this: My position, as I stated, is a peculiar one——

X Q. 177. I am not interested in this unless the Court is. I want to know how many employees or assistants you have there now?

A. How many I have?

[fol. 90] X Q. 178. Yes.

A. I have the authority to call on any man in the Department of Public Works.

X Q. 179. How many assistants have you now, or employees? I am not talking about those who are employed by the Department of Public Works. Have you any?

A. Yes, I have. I think I see what you mean. I want to get it clear, Mr. Cox. I have directly assigned certain assistants to certain work. In my central work, I assign an assistant, that is, directly. On the Union Station work, I assign an assistant directly, or on any other work I assign an assistant directly. At the present time I have those three, with the office man, four all told.

X Q. 180. They are employed by the City of Chicago, these men?

A. Yes; indirectly by the City of Chicago.

X Q. 181. Referring to this apparatus which you say you used on the Black Rock job in 1900, were there any drawings or sketches or photographs made of the machine at that time?

A. Nothing other than probably just a rough sketch.

X Q. 182. Did not somebody make that machine and charge for the materials and time that went into the making of it?

A. I presume that it was charged up, yes, but it is just like picking up this piece of pipe one place and the castings somewhere else or the valves somewhere else, maybe on the job. There was no direct order placed.

X Q. 183. Was not some entry made in somebody's books at that time in connection with the making of that machine?

A. That I do not know.

X Q. 184. At any rate, you have nothing today in the nature of a drawing or sketch or piece of the machine or [fol. 91] book or bill dating about that time, to show the date or what it was?

A. I am inclined to say no.

X Q. 185. Have you not looked for it?

A. No, I have not.

X Q. 186. Have you not made any inquiries for that sort of stuff?

A. No.

X Q. 187. Did not defendants' counsel ask you to look up such things?

A. No.

X Q. 188. Then you have nothing today, so far as you know, that originated prior to the present year in the nature of a book entry or sketch or drawing or part of a machine or any visible evidence to show what that machine was or where and when it was used?

A. I would be inclined to say no, Mr. Cox.

X Q. 189. Have you endeavored to find anyone who saw you use that machine or knew about the use of it?

A. No.

The Court: Which machine is this, the one he used in 1911?

Mr. Cox: In 1900, at Black Rock, the one represented by the sketch, Exhibit E.

Mr. Johnson: Fig. 1 of Exhibit E.

Mr. Cox: Yes.

X Q. 190. Can you give us the name of anyone living who knew about that machine at Black Rock in 1900?

A. I have never been back to Watertown since I left. That is 26 years ago. I do not know whether they are living or not.

X Q. 191. Can you give us the name of someone who knew of it at that time, someone living?

A. I do not know whether they are living or not. If you [fol. 92] leave that "living" off, I can give you the names of some that I knew who were living at that time.

X Q. 192. Give us the name of someone living or dead who knew of the use of that machine in 1900?

A. I had a foreman by the name of Grannis——

X Q. 193. How do you spell that?

A. G-r-a-n-n-i-s.

X Q. 194. What was his first name?

A. Fred was his first name.

X Q. 195. About how old was he at that time?

A. He was in the neighborhood of 50 or 52 or 53; somewhere in that neighborhood.

X Q. 196. So he would be pretty well along toward 80 if living.?

A. He would be along in the seventies, yes.

X Q. 197. Anyone else that you can think of?

A. There was one of the members of the firm, James Ward.

X Q. 198. How old was he at that time about?

A. He was about the same age; possibly a little older.

X Q. 199. So these two men, if living now, are somewhere over seventy and along toward eighty?

A. Yes, I would say in that neighborhood.

X Q. 200. Did they both see this machine?

A. Yes. The machine was made—I would like to explain that a little bit.

X Q. 201. No, I am only asking whether they ever saw the machine?

A. It was made for them, yes.

X Q. 202. Did they see the machine?

A. It was made for Haley Ward, and Grannis was the [fol. 93] superintendent for Haley Ward.

X Q. 203. Did they see this machine and see it operate?

A. I know Grannis did.

X Q. 204. You do not know whether Ward did?

A. No, I would only have to assume that.

X Q. 205. I believe you said that you first used this machine which I will call the Black Rock machine with a top compressed air inlet only; is that correct?

A. In there (indicating)?

X Q. 206. Yes, shown in Fig. 1 of Exhibit E?

A. I do not think I said that.

X Q. 207. Then you did say, I think, if you did not have the compressed air inlet at the bottom, the compressed air at the top would blow through and defeat the operation of the machine; is that correct?

A. Yes, I said that.

X Q. 208. Will you explain just why that is?

A. Why the air will blow through the mass?

X Q. 209. Yes.

A. Of course, whether it blows through or not, Mr. Cox, is going to depend on the thickness of your mass. If you have a wet—let me make an extreme example—if you have only a liquid into the chamber itself with the discharge end open, you are going to blow the air directly through that liquid. Your other extreme is to imagine a solid plate. Let us make it an absolute extreme and say it is a steel plate in there. Of course, the air can not penetrate through that. Now, between the liquid and the solid plate, you have a great variation between which the air either will blow through or will not blow through. There is some particular point in there which is just on the balance.

[fol. 94] X Q. 210. We will use ordinary grout, which is a very fluid substance in such a machine as that shown in Fig. 1 of Exhibit E. Will that blow through?

A. It is a flowing substance, if it is kept agitated—and I am going to say right here that the trouble with that machine identified by the No. 1 on Exhibit E was that the material did get over that pipe, did clog it.

By the Court:

— Q. 211. What pipe?

A. Over the opening E leading into the discharge pipe. I explained that yesterday, and that we put this plug S in, to put a rod down in there and plug that out. That machine had to be agitated.

By Mr. Cox:

X Q. 212. You had to stick a rod down in the tank and get the packed material away from the discharge opening?

A. Yes, if your grout is real well, your ingredients are going to separate comparatively quickly from the water——

X Q. 213. I am not asking that. I want to know what you actually did. You had put a rod in there for breaking up the material and getting it away from the discharge opening where it was packed?

A. Yes, and this in Exhibit 1 had to be violently agitated until we could get the air started through from the valve A through the machine to carry the grout along.

X Q. 214. In this McIlvrid patent that you have referred to, do you find any bottom air inlet or lower air inlet?

A. No.

[fol. 95] X Q. 215. In that machine shown in the patent, there is only a compressed air inlet in the top of the machine; is that correct?

A. That is all, yes.

X Q. 216. And there are paddle wheels inside the machine to agitate the material?

A. Yes.

X Q. 217. And is it your testimony that without those paddle wheels, the machine would not operate properly?

A. I would not say that it would not operate, but the introduction of the paddle wheels keeps the material agitated, and that is just exactly what you are trying to do when you force that air through. On this McIlvrid, the material is being agitated by paddle wheels and the material is carried down with it and forced through that discharge pipe.

X Q. 218. What I want to know is whether, if you can state, that McIlvrid machine could be operated without the rotating paddle wheels inside the vessel?

A. I sincerely doubt that it could if it was placed in the same position that it is there.

X Q. 219. You would have to make some change in the construction and arrangement in order to get it to work; is that it?

A. Not necessarily making a change. You would have to make some arrangement for agitating the material, either using the machine itself and rolling it to keep that going until you got rid of it.

X Q. 220. You are talking about using this McIlvrid machine with grout?

A. Yes.

X Q. 221. With ordinary grout—I do not think you have answered my question—and with a top outlet only such as [fol. 96] is shown in Exhibit E, Fig. 1, and in the McIlvrid patent, would the compressed air bore down through the material?

A. There is a qualification as to how thick your material would be.

X Q. 222. With ordinary grout?

A. I know, but you can pack water so that you can not float through it. I think I can explain your question. Let us say that the diameter of the cylinder in that machine was two feet. If you had six inches of material on the bottom without a paddle wheel, so there was no agitation whatsoever, in other words, the machine was at rest, and you turned fifty or sixty pounds of air in through the top valve and opened up your bottom valve, there is no question but what you would blow a hole through that six inches of grout.

X Q. 223. And you would not discharge the grout. You would blow a hole through it?

A. You would have to discharge some of it.

X Q. 224. You would not get a discharge of the batch of grout in the mixer?

A. Not lying on its side like that.

X Q. 225. How about in the position shown in your sketch here, Exhibit E, Fig. 1?

A. That is just exactly what I said; that it was not satisfactory, the fact that the material piled up from the opening 6 towards the sides of the cylinder. In other words, there was practically a cone of material which was blown out.

X Q. 226. You have described an apparatus which you say was used in Chicago in 1903. That was at 177 Monroe Street, you now say?

A. East Monroe Street, yes, sir.

X Q. 227. Do you remember who owned that building?

A. I do notk now who owned it.

[fol. 97] X Q. 228. Do you remember who occupied it?

A. George W. Jackson occupied it.

X Q. 229. The entire building?

A. He had the entire building; double building.

X Q. 230. Was not that building occupied by the Tunnel Company?

A. It may have been the Tunnel Company, but George W. Jackson was the controlling feature of the Tunnel Company.

X Q. 231. I do not want you to argue this matter. I want to get through. The Tunnel Company had its men and its equipment in that building, did it not?

A. So far as that goes, I can not say whether they were directly employed by the Tunnel Comany or by George W. Jackson.

X Q. 232. It was a building occupied by those engaged in the Tunnel Company's work?

A. Not necessarily; not all of it. They were practically 90 per cent of the time engaged on tunnel work.

X Q. 233. Do you know what Mr. Jackson's connection with the Tunnel Company was at that time?

A. Jackson was engineer for the Tunnel Company and he was at that time, I think, also general manager.

X Q. 234. So that his occupation was conducting the operations of the Tunnel Company?

A. The operations of the Tunnel Company was only construction.

X Q. 235. His chief occupation was conducting their operations; is that right?

A. Now, I would not say as to that because I would not be competent to say.

X Q. 236. You mean you do not know enough about what Mr. Jackson was doing, to say?

A. I mean to say this, that I do not know what a man is [fol. 98] doing in his private capacity except so far as I come in contact with him.

X Q. 237. Mr. Jackson was a prolific inventor, was he not?

Mr. Johnson: I object to that.

Mr. Cox: That is very material, I think.

The Court: Objection overruled.

A. That I do not know.

X Q. 238. You know that he had a large number of inventions, do you not, that he was working on from time to time?

A. No, I knew of only two.

X Q. 239. What were they?

A. One was a loading machine and the other was a steel sheeting machine.

X Q. 240. I understood you to say that you were a pretty close friend of Mr. Jackson's; is that correct?

A. I said I was a pretty good friend of Mr. Jackson's.

X Q. 241. And that you came in contact with him quite often?

A. Yes, I came in contact with him.

X Q. 242. And yet you did not know that Mr. Jackson was developing any inventions except these two that you mentioned?

A. Jackson was very secretive about a great deal of his work——

X Q. 243. Now, please answer the question.

Mr. Cox: I object to this witness entering into explanations instead of answering questions. If you will read the question and answer, you will see what it amounts to.

[fol. 99] (X Q. 242 read.)

Mr. Johnson: Your Honor, they are absolutely fair and responsive answers and the attorney should not browbeat the witness.

The Court: Go on with your questions.

Mr. Cox: I am trying to get through with this examination.

X Q. 244. Did you not know that Mr. Jackson was working on any other inventions that he did not have to be secretive about, that he obtained patents for?

Mr. Johnson: I object to that.

The Court: Objection overruled.

The Witness: Will you please read the question.

(X Q. 244 read.)

A. No, I would not say that I positively knew any other patents.

X Q. 245. You made an affidavit in this case in June, 1926, did you not?

A. Yes.

X Q. 246. And your present testimony is that in that machine used by Mr. Jackson in 1903, he used stone up to an inch and a half in diameter; is that correct? Or crushed gravel?

A. I think I corrected that to say crushed gravel which runs up to an inch or an inch and a half in diameter.

X Q. 247. In this affidavit that you made in June of this year, you said "On this 170 East Monroe Job in 1903, I saw them mix sand, cement, water and gravel up to one-half to three-quarters inch in a concrete mixer and then place the [fol. 100] mixed concrete in the tank A through the cover B"; referring to the drawing from which Exhibit E, Fig. 2, was made. You made that statement, did you not?

A. Yes.

X Q. 248. So that the size of that crushed gravel used by Mr. Jackson has increased in your mind since June from three quarters of an inch maximum to an inch and a half?

A. No, I did not say that.

X Q. 249. You now say that he used up to an inch and a half?

A. I said crushed gravel—probably I did not make it absolutely clear. Crushed gravel running from an inch to an inch and a half. Let me explain this way: There are different sizes. We classify from half an inch to an inch as one inch gravel because it would pass through a one inch ring. We classify as an inch and a half gravel from one inch to an inch and a half or anything that will pass through an inch and a half ring. So I am perfectly consistent, Mr. Cox. If I say we use three-quarters of an inch gravel, what I mean is probably the average was three-quarters of an inch. Maybe the minimum even ran below half an inch. It sometimes slips over the screens. The largest may have been larger than an inch because it may not have been absolutely an inch in all directions.

X Q. 250. Then your statement in this affidavit that Jackson used gravel up to one-half to three-quarters of an inch is not the statement that you wish to make now; is that correct?

A. I will say this——

X Q. 251. Why not answer it?

A. I am going to answer it absolutely to your liking. I will say that I have my sincere doubts on 10 per cent of the

[fol. 101] gravel coming into Chicago being an inch and a half, although classified as that. I doubt if 20 per cent would run over an inch in diameter. We as engineers can call for crushed gravel from an inch and an inch and a half and know very well that we are lucky to get an inch. In other words, here is our whole object in Chicago. The crushed stone people had a monopoly and we wanted to break the monopoly or at least allow competing material gravel to come in with us. We shut one eye when we look at the sizes. It is immaterial.

X Q. 252. Is that statement in your affidavit correct or not, that the gravel used by Jackson was up to one-half to three-quarters of an inch?

Mr. Johnson: The witness has answered that question, your Honor.

The Court: Objection overruled.

A. In other words, what you want is what is the absolute say as to my recollection regardless of that.

X Q. 253. I want to know whether that statement in your affidavit is correct or not?

A. Yes, I will say that it is correct.

X Q. 254. And then your statement that the gravel used by Jackson was up to an inch and a half in your testimony here is not correct, is that right?

A. I just qualified that a moment ago. I explained just exactly what I meant.

X Q. 255. And you do not care to make any further qualification. You are satisfied to leave it at that?

[fol. 102] A. Yes.

X Q. 256. You have said in your testimony here, I believe, that Mr. Jackson used on that machine an air pressure of 35 pounds or more, is that correct?

A. I think that that is very close to correct.

X Q. 257. Well now, in this affidavit made by you in June you said, "After the tank A was full of mixed concrete the cover B was closed and the valve G and the air pipe B was opened to admit air of between 80 and 100 pounds pressure above the charge of the mixed concrete in the tank." Did you not make that statement?

A. That is true, too.

X Q. 258. Now, the size of this delivery pipe, the pipe at the bottom shown in Figure 2 of Exhibit E, what was that?

A. The pipe H?

X Q. 259. The pipe H?

A. The pipe H was a six inch pipe.

X Q. 260. And I believe that you said that the pipe F was about a two inch pipe?

A. Two or two and one-half inch.

X Q. 261. In your affidavit made in this present year in June, the affidavit to which I refer, you say that the "upper air passing through the pipe D above the charge forces the mixed concrete down through the exit pipe G of four inches and the other air passing down through the pipe F impels or forces this concrete and forces it out through the pipe H which was four inches." You made that statement, did you not?

A. I thought I said four or six inches on that.

X Q. 262. You made that statement, and I will show you a copy of the affidavit. Yes or no, please.

[fol. 103] Mr. Johnson: Here is a copy of your sketch.

Mr. Cox: Why coach the witness while I am cross examining him? I have not interfered with counsel.

The Court: Do not be handing the witness things when he is cross examining him.

A. Frankly it says so here but I did not appreciate it until just now.

X Q. 263. By the way, Mr. Artingstall, what was the date of your marriage in 1904?

A. June 18th.

X Q. 264. June 18th?

A. Yes, sir.

X Q. 265. This work on which you said you saw Mr. Jackson use a machine of Figure 2 of Exhibit E was in connection with the putting in of a tunnel in that building, was it not?

A. No, it was a floor in the building itself.

X Q. 266. What floor was it?

A. The basement floor.

X Q. 267. And had not they connected that with a tunnel, with the tunnel system? Did not this underpinning and the laying of the floor, was that work that was required by the tunnel connection?

A. No, not the part that I saw them putting in. That had nothing to do with the tunnel connection. In fact, I would not say whether there was a tunnel connection in there or not.

X Q. 268. You do not remember whether the tunnel was connected there at that time or not?

A. It was what you might call a machinery room. There was a compressor and various other machines there, and I never went down through that entrance. If there was a [fol. 104] tunnel in there I never went down there.

X Q. 269. Do you know whether the building is connected with the tunnels in the street?

A. No, I have never had any occasion to check on that.

X Q. 270. Now, this work of laying the floor that you have described, was that different from any other floor laying job?

A. No different except that there was machinery around the different places, that was all.

X Q. 271. In laying a floor it is usual and customary even today just to take the concrete, mix it and flow it out on the floor, is it not, through a chute or by means of wheel barrows?

A. With an ordinary man, yes.

X Q. 272. With ordinary men that is what is done?

A. With an ordinary man.

X Q. 273. That is what is usually done, is it not?

A. Yes, I would say yes, an ordinary man. In 99 cases out of 100.

X Q. 274. And where you are putting underpinning under walls it is only necessary to run the concrete down through a chute or shovel it down, it is not?

A. No, the underpinning of the walls is a pretty ticklish proposition.

X Q. 275. Well, is it usual just to shovel or run the concrete down through a chute, is it not, to the place where it is packed?

A. Well, it might be to the layman, but there are lots of things besides that.

X Q. 276. This machine that you describe as having been used by Jackson in 1903 did not pack the concrete, did it?

A. No, it was only transporting it.

[fol. 105] X Q. 277. It was only transporting it. If it needed packing that had to be done afterwards?

A. The material was wet enough so that it would pack itself.

X Q. 278. At any rate the building at No. 177 East Monroe Street where you say this work was done by Jackson was a building principally occupied by the work of the tunnel company, was it not?

A. Well, I stated that I did not know whether they were tunnel employes or whether they were George W. Jackson employes. Jackson also ran the Jackson Bridge & Iron Company.

X Q. 279. That was not located at 177 Monroe Street, was it?

A. No, his shop was farther up the river, but whether the men were designing on that, I do not know.

X Q. 280. Do you remember about what the size of the vessel was that you have described as used by Jackson in 1903?

A. Do you mean the machine?

X Q. 281. Yes.

A. To the best of my recollection that was in the neighborhood of 20 or 24 inches in diameter. Let us see, if I just stand up I will get an idea as to the way it looked. The platform itself, we will say, is four feet off the ground; the incline section comes down about in the neighborhood of 15 inches below the platform, and the upper section was two feet or maybe 27 inches above the top of the platform itself. Is that sufficient?

X Q. 282. Yes.

The Court: Where was the machine with reference to [fol. 106] the concrete, or fluid, however you may describe it, that was deposited?

The Witness: It was deposited in different ways, your Honor.

The machinery was lined up along the wall. There were pipes of various kinds in there, and the only reason I could see for using this machine in that particular case was to prevent the slopping of the concrete when they would throw it in shovels over the machinery. That was the only reason I could see why he would want to use it.

X Q. 283. It splashed your clothes pretty badly, did it not?

A. Oh, yes, but that was when he was dumping it to another section. Remember there was a line of machinery partially along on the east side.

The Court: Why would not a funnel have been just as well?

The Witness: You mean a large funnel?

The Court: Yes.

The Witness: Your Honor, I will have to digress just a minute. If you knew George W. Jackson you would know anything he did——

The Court: I am not saying what he would do, or the characteristics of George W. Jackson. I am asking you why it would not have done just as well.

The Witness: I would have taken and covered the machine with a few planks, and thrown a tarpaulin over it and [fol. 107] put a little spout in there and shoveled the concrete into the spout and into place, like an ordinary man would have done.

X Q. 284. Can you state what the discharge pipe of this apparatus was made of, this Jackson apparatus which you have testified about?

A. It was what we call spiral riveted pipe.

X Q. 285. And how about the part of the pipe that you say went up and down over something and down again?

A. Do you mean what we call the goose-neck?

X Q. 286. Yes.

A. That was all spiral riveted pipe.

X Q. 287. And this bag on the end of the pipe, what was that made of, do you remember?

A. Just an ordinary burlap or cement bag.

XQ. 288. Can you make a sketch of that basement in which you say this machine was used, and indicate on that sketch where the underpinning was done and where the floor was laid, and where the machinery was located?

A. I think I can describe it to you.

X Q. 289. I would like for you to make a sketch. I will hand you a piece of paper.

A. (Witness does as requested.) You appreciate this will not be to scale. It will be perhaps indicative of what was there.

In order to save some sketching, I will say that the entrance to the building was practically in the center of the building, and then passing in on the first or ground floor to the right of which was some clerical help, and a short way back was the elevator, then just in the rear of this elevator was a stairway, which led down to the basement. [fol. 108] That I am merely explaining so that you will understand. I am going to leave off getting to the basement. See whether this will answer your purpose. This is East Monroe Street at the bottom of the page. North is to the back which I will indicate by an arrow. Along the west wall there were various machines, whether they were permanently installed there or not, of course, I do not know. There were several machines along in through about not quite the middle, a little bit to the west of the middle of the building itself.

There were some columns coming down at various points along in through what would be the middle of the building. This is really a single building but built on two lots, possibly 50 feet frontage. Whether it is 50 feet or 40, I do not know.

The concrete mixer itself was installed slightly to the north and practically, well, I will say not more than five or six feet west of the center of the building.

X Q. 290. Well, just make an "M" there to indicate where the mixer was.

A. We will put it right here. Now, you asked about the concrete which was put in. The first concrete which we put in and which I saw being put in, and which I am telling you was splashing where I got my decorations, ran over this series, or the pipe ran over this series of machines which I will call No. 1, and deposited in due course to the machines practically taking up that bay between the machines along the west wall, and thence running down just west of the center. I will indicate the outlet of that pipe [fol. 109] approximately by the circle there.

X Q. 291. Better mark the pipe P or something like that.

A. All right. I will mark the pipe P, and mark the outlet O.

I will not necessarily indicate the box in which that was dumped. You will understand that that box was below. That was the first piece supposedly, and I will shade ap-

proximately the cross arch or the piece of flooring which I saw put in, centering, let us say, roughly around this end of the pipe which I have marked O.

X Q. 291. And how big was that piece of flooring?

A. This west half of the building is approximately 25 feet wide. The machines, the ones marked No. 1 there have a space of about 4 feet; and the machines along the west side there, I will mark those No. 2, were set about 2 feet or possibly a little bit more from the wall, and I will say that they probably averaged 30 inches at the foot, 30 inches across, in that neighborhood.

X Q. 292. Were they concreted in at the base, the machines?

A. My recollection is that those were, and many of them were on skids. Now, whether it was pieced under, I do not know.

X Q. 293. Now, indicate where the underpinnings started.

A. Now, when I saw the underpinning done this pipe was swung over to the west. Supposing I indicate it with a dot. Understand that there are bends and one thing or another in there, but roughly it is shown as indicated by the dotted line, and we will call it G for that pipe.

[fol. 110] That underpinning was along on the west wall back of where I have labelled the various machines No. 2. Roughly, I should say, all I saw them do was ten feet or so, possibly, of that underpinning.

X Q. 294. And did that underpinning run the entire length of the wall?

A. That I do not know. As I said, I saw them do about 10 feet of it.

X Q. 295. And this patch of concrete that you say you saw them do was about what size, approximately?

A. This was about 5 feet. Roughly, that would be between 10 and 15 feet. I should say 15 feet, closer to 15 than 10 feet wide, and about 20 feet long.

Understand, Mr. Cox, I am not going to say that I saw the whole of that piece put in. That is where they were working.

X Q. 296. How near the front of the building was that patch of concrete floor?

A. Well, I would say approximately that that was about a little bit north of the center of the building. My recollection is that these buildings are about 125 feet in depth.

Mr. Cox: Now, I will have this sketch marked for identification.

(Marked Plaintiff's Exhibit No. 10 for Identification.)

X Q. 297. Now, as I understand your testimony, Mr. Artingstall, you have no drawings, sketches, description or photographs of this machine that you say was used by Jackson in 1903?

A. I would be inclined to say no—oh, Jackson's 1903?

[fol. 111] X Q. 298. Yes.

A. I do not know whether I have or not. I have not looked for any.

X Q. 299. Did not defendants' counsel ask you to look for such things?

A. No.

X Q. 300. Did not ask you to look for any drawings, or sketches or photographs or any part of this machine that might be in existence?

A. No.

X Q. 301. Do you know whether the drawings or not were made at that time?

A. That, I do not know whether they were or not. You see I was not connected with Jackson at all.

X Q. 302. You were a friend of Mr. Jackson, were you not, and met him quite often?

A. Oh, yes.

X Q. 303. Did not you learn in the course of your relations with Mr. Jackson whether he did have a drawing or a sketch or description made of this machine?

A. Oh, no, not any more than I would learn when I would go out to the bridge shop and ask him for the blueprints of the piece of work he was putting through the shop. I was not interested particularly whether he had any drawing or not.

X Q. 304. Then you do not know whether any drawings were ever made or any photographs or other illustrations of this machine?

A. Not of my own knowledge, no.

X Q. 305. And you have not tried to find out?

A. No.

X Q. 306. Have not you asked, Mr. Artingstall——

A. Let me just correct that a minute. I called Mr. Slade who is now engineer for the Chicago Tunnel and was connected with Jackson a number of years, and went with the [fol. 112] Tunnel Company, either connected with Jackson or the Tunnel Company for a good number of years, and I asked him if he had had anything relating to the machine. He said that they had nothing going back to 1907. I think it was 1907 when the Chicago Tunnel Company superseded the Illinois Tunnel. In other words, their records started with the present concern, not the old.

X Q. 307. Why did you ask Mr. Slade?

A. Why did I ask Mr. Slade?

X Q. 308. Yes.

A. Because I knew that if anybody had it Slade was the man that would have it.

X Q. 309. Was Slade connected closely with Jackson at that time?

A. Yes, very closely.

X Q. 310. And knew what Jackson was doing?

A. Slade was really Jackson's office engineer, I think.

X Q. 311. Is Mr. Slade here today?

A. I have not seen him.

X Q. 312. Did not you ask him to come here?

A. No, I have not. Why should I ask him?

X Q. 313. Did not defendants' counsel ask you to hunt up corroboration or something like that in this case?

A. They asked me if I knew anybody else that might say anything about this, and I said that the only one I knew would probabyl be John T. Fanning or Slade. I called Slade, and he said, "No, I have not got any records." Slade is a very, very old man and very feeble, and I talked to him over the phone.

X Q. 314. Do you think he could stand a trip from Chicago to New York?

A. Well, the best way to do is to ask him.

[fol. 113] X Q. 315. You did not ask him that?

A. Understand, Mr. Cox, I am not gathering witnesses on this case; I have no interest in it.

X Q. 316. Did not you receive a fee for your services and giving this information?

Mr. Johnson: I object to that.

X Q. 316. (Continuing:) In connection with giving this information to the defendants?

The Court: Overruled.

A. Yes, I have received a fee for my services.

X Q. 317. You received a fee last June when you gave them this affidavit, didn't you?

A. Yes, afterwards.

X Q. 318. Now, what is Mr. Slade's position now?

A. As to his exact position or title, I could not say, but he is engineer for the Chicago Tunnel.

X Q. 319. That is the company or the successor to the company or companies that have been building this tunnel right along, is it not?

A. Yes, building or operating it. In other words, they are all the same. What the legal applications are, I do not know.

X Q. 320. During the last 23 years since 1903 you have seen a great many concrete machines, have you not?

A. Quite a number.

X Q. 321. You have seen concrete mixers, too, have you not?

A. Of various kinds.

X Q. 322. You have seen, for instance, the Koehring concrete mixer, haven't you, during the last twenty years?

A. A cubical mixer?

[fol. 114] X Q. 323. No, the Koehring mixer, a round drum?

A. Yes, I know what you mean.

X Q. 324. Do you remember anything about the construction of that?

A. Let me see. That is the one, if I am right, with the various vanes in the inside of the drum.

X Q. 325. Have you ever seen a drum cylindrical concrete mixer that did not have concrete vanes on the inside?

A. Not lately. There were some a number of years ago.

X Q. 326. At any rate, you do not remember how the discharge chute or the vanes of the concrete mixer manufactured by the Koehring Company in Milwaukee and used extensively in Chicago are arranged?

A. No, I have not been interested particularly in what we might call the open batch mixers. The only thing, so

far as the machinery would interest me, is where it might be unusual, or of such a type as this, or such a type as one of the old gravity mixers, which was a spout with various arrangements of pins through it.

X Q. 327. You have also become during the past fifteen years or so very familiar with the operation of pneumatic mixers, haven't you?

A. No.

X Q. 328. Placers and conveyors?

A. No. I only used a pneumatic mixer at one time.

X Q. 329. You became familiar in 1911 and afterwards with the construction and operation of the McMichael machine, the McMichael pneumatic conrete mixer?

A. Well, as I said, the only experience I personally have had with the pneumatic conveyors was on that La Salle job in 1911, running into a little bit in 1912, the early part of 1912.

[fol. 115] X Q. 330. Now, on this job in 1911 and 1912, had McMichael used that machine before you made the suggestion which you say you made on that job? Had he used it on that job?

A. Had he used it on the job?

X Q. 331. Yes.

A. He used it on the opposite side of the river as a grout machine.

The Court: Are you referring to this?

Mr. Cox: No, I am referring to the machine here shown, the McMichael machine.

X Q. 332. Now, then, prior to the time of this suggestion which you testified to, McMichael had not used the machine on that job in 1911 and 1912; is that right?

A. No, I think he used it on the opposite side of the river with the grout machine.

X Q. 333. Never mind about that.

A. That was the first time that I had seen his machine in actual work.

The Court: That was in 1910.

The Witness: 1911, your Honor.

X Q. 334. I believe that you have stated you were the engineer on the La Salle Street job?

A. I was.

X Q. 335. Were you the engineer there or was it your father?

A. No, I was. Well now, wait a minute. There were two or three different operations on the La Salle Street Tunnel. One in 1886 was my father.

X Q. 336. I am talking about this job in 1911 and 1912?

A. On which this work was done?

[fol. 116] X Q. 337. On which the McMichael placer of Exhibit F was used?

A. That was my own.

X Q. 338. That was your job?

A. That was my job, yes, design and specifications and superintendence for the Board of Supervising Engineers.

X Q. 339. Mr. Artingstall, I believe it is your testimony that in 1911 you told Mr McMichael to put the air jet at the bottom, as shown in this Exhibit F. Where do you say he had that jet prior to the time when you told him that?

A. As far as the outward appearance of the machine is concerned, there was no further connection other than the one which is marked No. 1 entering at the top of the machine itself.

By the Court:

Q. 340. The answer is before that it had been at the top?

A. Yes.

By Mr. Cox:

X Q. 341. And no jet entering the machine except at the top?

A. That was all.

X Q. 342. Do you know whether that was the machine that he had previously used for grouting?

A. This machine here (indicating)?

X Q. 343. Yes.

A. That machine is the same machine which we had on the other side of the river. This picture shows the north side of the river. We used it on the south side of the river as a grouting machine. But we had considerable trouble even with this pipe P.

X Q. 344. It was your opinion that the trouble with the machine was that it did not have a jet except at the top?

[fol. 117] A. I suggested that he could eliminate some of the crowding at the bend, pipe P, by tapping it and putting that additional jet in at the bend.

X Q. 345. Did not Mr. McMichael say anything to you about having done that before, on previous machines?

A. No, as far as I know, this was the only machine that McMichael ever built. I do not know whether he ever built any before or not.

X Q. 346. In your statement in this Western Society of Engineers' article, which I believe is marked H for identification, you say, "From that time on it was dropped until about 1907 or 1908, when the Drake Machine Company here in Chicago took it up and started to improve it." Now, that refers, as I understand it, to this Jackson machine that you have described and which you have shown in Fig. 2 of Exhibit E? A. Yes.

X Q. 347. So that the machine, whatever it was, used at the time you have testified to, say it was 1903, was dropped until 1907 or 1908?

A. So far as the machine of the same type shown in that Fig. 2 on Exhibit E.

X Q. 348. Did you see any of the work or tests that went on at the Drake Machine Company in 1907 or 1908?

A. I was over at the Drake Machine Shops possibly—well, to be conservative, say three times. The reason for that was this: The McGovern Company had ordered this machine from the Drake Company or from McMichael. Now, it was over at the Drake Machine Shops and they were having considerable difficulty in making any kind of [fol. 118] delivery. To be frank, Mr. McMichael was his own worst enemy, and it was very hard to catch him. I went there on a number of occasions with the superintendent for McGovern, to be conservative, say, two or three times. That was practically the sole contact I had with McMichael's machine until it was delivered on to the job.

X Q. 349. And then the machine that you saw at the Drake Company in 1907 or 1908 was the machine that Mr. McMichael was making?

A. It was later than that. It was this same machine here.

X Q. 350. The same machine shown in Exhibit F?

A. Yes. That was brought directly over from the Drake Machine Shops.

X Q. 351. I believe you have stated in substance that concrete discharged from this machine such as that shown in Exhibit F is mixed with the air that is fed into the machine?

A. No question about it.

X Q. 352. That is your testimony?

A. Yes.

X Q. 353. How does that air get out of the concrete?

A. It gets out of the concrete when it is discharged at the end of the pipe.

X Q. 354. While it is passing through the pipe, you mean?

A. No, at the end. It is a part of the force until you get the mass deposited in the place where you want it. You can see that when you deposit it, dropping it, for instance, into this box that you spoke about at the end of this goose-neck pipe called H there. When the mass of concrete was dropped down in there from the pipe, the concrete itself was bubbling right up.

[fol. 119] X Q. 355. That is the way, in your opinion, that the air got out of the concrete that you observed?

A. There is no other way for it to get out. I am just going to qualify it to make it clear. There is no other way for the air to get out providing that there is not an excess of air transmitted through the discharge pipes.

For instance, if your concrete had already been discharged through this 16 and your valves C and E still open, you would be discharging the air out of them (witness referring to Fig. 2 of Exhibit E).

X Q. 356. But concrete is a rather sticky substances, is it not, always?

A. No.

X Q. 357. You referred to an emulsion of air, I think. What did you mean by that?

A. I said that it could be termed, the mass is emulsified. In other words, each individual particle had more or less of another substance around it. That is, the air is doubtless around every one of the particles, whether it be stone or cement or sand, more or less.

X Q. 358. That air must get out of the concrete or else the concrete will be defective and have flaws in it?

A. If the air was still ingrained in the mass after it was in place, most assuredly.

X Q. 359. And then the air would have to get out of the concrete by simply rising as bubbles of air do in water to the top?

A. Yes, that is what gives you latence on the top of your concrete.

By the Court:

Q. 360. You talked at one time of the formation of some kind of an emulsion between this air and this water and the cement and any gravel or stone that was in there?
[fol. 120] A. Yes.

Q. 361. And you talked about some flotation principle. You do not regard the propulsion of this mass through a tube in order to deposit it in some place, whether below or above, as really flotation, do you?

A. I most certainly do, your Honor, and I will show you why——

Q. 362. I will give you plenty of chance to show that. But this air that gets in there is all mixed up.

A. Is mixed up with the concrete ultimately.

Q. 363. How can the air be pushing when it is mixed up? Has it not got to be pushing from behind?

A. Not necessarily.

Q. 364. I mean unless there is a stream of air. Of course, if there is a stream of air, that scatters the thing the way it would dust. I can see how that can propel grout as it might propel dust, but I do not see how a certain emulsion formed by the introduction of air could have an accelerating effect.

A. That is just exactly what it does do, and the comparison with dust can very well be taken because the air which is in the mass—first, let me say that the air is behind the mass.

Q. 365. The air is behind the mass, and that pushes it?

A. It comes down through here (indicating) through the bottom of the opening G of Fig. 2 of Exhibit E. The mass is then carried along the pipe H. That comes down before it is what I call emulsified or mixed up. Let it come down as a slug or piston. It enters into this pipe H, coming along through the right and toward the discharge end. What happens? In front of that slug is a pressure which [fol. 121] is absolutely uniform over the entire area of the

pipe. Behind it, just at the starting point, is an air pressure which is absolutely uniform but greater in extent than to the advance of that particular plug.

What is there to prevent that from being carried along uniformly as a slug? Merely this: As the mass is carried along the pipe, the only difference between the pressure on the front of the slug and any point from the center to the periphery or outside is the fact that there is a friction on the outside of the mass.

Q. 366. The pressure where?

A. On the slug.

Q. 367. From behind?

A. From behind.

Q. 368. All right, I understand.

A. The slug has taken the position of a cone. In other words, the center is advancing more rapidly than the outside. It can only go a certain extent and before the center becomes the outside and what is now the outside becomes the center, there is a continual whirling out and that is shown very evidently if, as was done in the McMichael machine at the Drake Company, when he put cement bags into the machine and passed them out twisted and turned and some of them even turned inside out.

Q. 369. You mean that by reason of this friction and the more rapid advance of the inside, the outside finally collapses? *A*. Why does the outside become the inside?

A. Because the pressure is relieved on the point of the cone which is then necessarily brought to the outside of the tube. If that was not true——

[fol. 122] Q. 370. You mean the friction relieves the pressure?

A. Yes, sir, and if that was not true, what would happen would be ultimately that this slug would be drawn out—if we will say it is a thousand feet long—this slug would be drawn out to an infinitesimal thickness and come out not as a big puff, but it would be drawn out ultimately like a slow flow of water.

Q. 371. How does the air get in there so that it is pushed by air behind? You say that it is a flotation principle, that the air behind is bearing against the slug all the time. If air gets introduced into this slug, I do not see what that is

except just a particle or particles of air in there. I should not think they would have any velocity.

A. They must have velocity.

Q. 372. The velocity of the air being carried along to the whole mass, but they are not pushing the mass?

A. They must, your Honor, because if they did not—what would happen if they did not do that? You would have this slug started with no pressure on the front of the slug and an enormous pressure on the back which would merely tend the same as you and I would do with a hammer hammering a piece of wood. We put the dent into it, solidify, in other words, the area around the head of the hammer. We would not interfere with the bottom part. Supposing we take a hatchet. What do we do? We cut through those grains of wood and it spreads out as far as their force will take it. That, as I see it, is this thing here.

Q. 373. I may be dense, I may be wrong about it anyway, but I do not see yet how this air which is introduced there [fol. 123] floats in it.

A. Your Honor forgets, or does not probably appreciate the technical point that the air at the back which is being introduced into the mass is of a greater pressure per square inch——

Q. 374. I understand that. That pushes.

A. Yes, sir. Now, then, let us say that the first cubic inch of air that got into the mass is propelled along a foot. It is dissipated. But we have got dozens of others, hundreds of others, cubic inches coming along pushing this same mass along. That is the reason I say there is an emulsification of the mass by the air.

By Mr. Cox:

X Q. 375. What velocity does the concrete have passing through the discharge pipe of one of these placers?

A. It depends entirely upon the unit air pressure and the capacity of the quantity of air which you insert into the machine or through the valve E.

X Q. 376. It has a velocity running up to a hundred feet a second, has it not?

A. It may. It depends altogether on how much unit pressure you put in.

X Q. 377. Your statement is that while that mass is moving at that terrific rate and the air is pushing at that, the air at the same time becomes emulsified?

A. Certainly.

X Q. 378. Your theory is, then, that a slug is formed at the outlet of the vessel, and that comes under the influence of the air at the bottom, and then this emulsifying [fol. 124] action takes place as it is going along the discharge content?

A. I did not say that my theory was that there was a slug formed. I merely presented that for his Honor's information.

X Q. 379. It comes down from the main vessel in slugs, does it not?

A. I can not conceive of it coming down in slugs, no. It is against all principles of mechanics to even imagine such a thing.

X Q. 380. Then your theory is not that there is a slug that the air breaks up at all?

A. As I said, I introduced the main slug, whether it means six inches in diameter or one inch, merely to exemplify for his Honor the fact that there was a certain piece of concrete in there.

X Q. 381. A certain mass of concrete is forced down into the discharge outlet, whether it be a foot long or two feet long or a few inches long; is that it?

A. There is a continual dropping of the mass in here into the pipe.

X Q. 382. Is it not your theory that the pipe is filled as the material rushes along? Is it not your theory that the pipe H is practically choked?

A. In a way, yes. The very fact that this valve C must be opened before the valve E in order to increase the pressure on the top and start that thing down, tends to keep the pipe H filled.

X Q. 383. Then the pipe H is practically choked throughout the entire length of the discharge pipe; that is to say, it is closed by the concrete; is that right?

A. No, I said it would not be absolutely closed. It is choked so far as the quantity of the mass of concrete coming from the mixer can do so.

X Q. 384. It is practically closed so that there is no free [fol. 125] passage of air through it?

A. I would not say that there was not some free passage of air through it. There may be a small amount, because you can not fell—I am only going to cite my own experience. The only way you can tell is that there is a certain amount of air comes out here before your concrete comes. Whether that is the air which is in the pipe alone——

X Q. 385. The air in the pipe must be forced out first, must it not?

A. Whether it is that air which is in the pipe alone or whether it is some of the air which was under pressure and either came through the valve C or the valve E, I would not state.

X Q. 386. After the concrete starts to come, then there is none of that free air coming out?

A. There is always some, because if your pressure at the rear did not exceed your pressure at the front, you would not have sufficient force to carry that concrete out.

X Q. 387. I mean there is no discharge of air through the concrete as it comes out?

A. The very fact that in this particular machine we have to put a bag over the top of it shows that the minute it was let out of the pipe, there was an expanion in all directions.

X Q. 388. If concrete is compressed under 100 pounds pressure, it will expand when released?

A. I can not imagine concrete being compressed to any such extent as that.

X Q. 389. If the pipe is not choked by the slugs of concrete, or whatever you may call them, what prevents the air from blowing through and exhausting the pressure?

A. The very fact that there is a cohesion or adhesion be- [fol. 126] tween the different layers of the concrete.

X Q. 390. That cohesion forms a mass which practically chokes the pipe?

A. No, that cohesion or adhesion may be broken up more or less by the air.

X Q. 391. You know that the pressure in the air supply on the top of the machine and on the jet at the bottom of the machine in any of these cases does not drop very materially during the discharging operation?

A. I will not agree with you on that because that depends altogether on how quickly you close the valves C and E.

X Q. 392. I mean while the discharging operation is going on, the pressure does not drop; the pressure is maintained on the machine?

A. The amount of air, that is, I mean absolute quantity which you use, is going to depend first on how far you want that material to be carried, and secondly how quickly you can close those valves after it has gone through.

Q. 393. I do not mean that. I mean when the machine is full and you turn on the air and the concrete in the machine is discharged, the pressure does not drop until the batch has been shot out?

A. I have seen it drop quite considrably, yes.

X Q. 394. How considerably, how much?

A. Take it, for instance, on this job here, Exhibit F, the pressures which we used varied, of course. Sometimes it would be higher and sometimes it would be lower. But I would say as an average the pressure would run between 50 and 60 pounds. I have seen it drop 20 pounds.

[fol. 127] X Q. 395. As much as 20 pounds?

A. Yes.

X Q. 396. As much as one-third?

A. As much as one-third. That was one of the difficulties of the machine.

X Q. 397. If the pipe was open, it would drop to nothing, would it not?

A. Yes, I have seen the head of the receiver blown off.

Redirect examination.

By Mr. Johnson:

R. D. Q. 398. Mr. Artingstall, just on the very line that you have been examined about, I would ask you what you mean by "emulsification"?

A. "Emulsification" is really the surrounding of one material by another, different kind of material. In sand, for instance, we could emulsify the sand by surrounding it with water, with a thin coat of water.

R. D. Q. 399. My question is too broad. I mean the emulsification of the concrete, getting it down to this state.

A. In that case I used, as you might say, a simile or a

picture. To confine it just to the other extreme, I would say that there is a mixture of the air with the concrete, of the air in different parts of the mass with the concrete.

By the Court:

Q. 400. Suppose you have an emulsion—I do not know whether you have taken any interest in that—but you have an emulsion in the carburetor, of air with the gas. That is one of the great problems, to get the mixture right. But there, as I understand it, the air performs no office at [fol. 128] all when they introduce it except to furnish the chemical that makes the proper combination. The movement of the gas or of the emulsion which they always really have to have is due to the suction at the other end of the big fan. I do not know whether the air floats anything. The air is pulled just as the gas is pulled, but that is a true emulsion in that case, is it not?

A. Yes, that is really a true emulsion.

Q. 401. It is called an emulsion?

A. Yes, we call it an emulsion. The gases are surrounded by the air—for what reason? So that when you get into the cylinders, you have your compression that is broken upon the oxygen of the air combines with your gases.

By Mr. Johnson:

R. D. Q. 402. Mr. Artingstall, to come back to your concrete, if I understand your testimony correctly, when a certain quantity of concrete comes down through this (indicating), between G of Figure 2 of Exhibit E, the air pressure or air, rather, from the pipe F picks up that certain quantity of the concrete and goes into it and emulsifies it; that is, the air is worked into that liquid concrete; is that right?

A. Yes, there is no question about that.

By the Court:

Q. 403. You think there is enough air all through it so that the air stream, so to speak, continues——

A. There is no question about that.

Q. 404. From this compressor or whatever it is?

[fol. 129] A. Yes, there is no question in my mind about that for this reason, your Honor——

Q. 465. Of course, the air would carry it if there was a sufficient air stream to float it going all the time, I mean if it broke up the other enough so that there was as much or more air than you dropped.

Mr. Johnson: As I understand the proposition, that is exactly as this thing operates.

By Mr. Johnson:

R. D. Q. 406. Is that your understanding?

A. I was going to say that is true for this reason: When you take an ordinary cylinder of this kind which is comparatively high with the opening in the bottom, what happens? This feeds out uniformly, but you get a cone working down from the center and the center of your mass goes out long before the sides do. In other words, whatever the material may be that is piled up, the material along the sides, which was at the same elevation as in the middle. center of the material makes its exit before the material on the sides, which was at the same elevation as in the middle.

Do I make it clear?

R. D. Q. 407. Yes. If I understand you correctly, there is not only air under pressure in pipe F, but there is a sufficient quantity of air under pressure to float the concrete that drops from the bin A and force it out through the pipe H by floating it in the air; is that right?

A. Yes. There has got to be sufficient air. If you car-[fol. 130] ried it to the absurdity and added, let us say, one pound of air, the material would drop into this pipe H and stop there, that is all.

R. D. Q. 408. If it was not floated out and impregnated with air, say a solid cartridge of concrete came down through the opening G and was cut off by the air in the pipe F and that cartridge was moved right along the exit pipe H, what would you get at the exit 16? No floatation or anything of that kind? I am taking that cartridge right through.

A. You mean just traveling uniformly?

R. D. Q. 409. Yes.

A. You would have continual wads being dropped out one after the other. I can not conceive of that and I will tell you why. Supposing that we had a wad here just at the connection of the pipe G or the opening G and the pipe H, and we had another one, let us say 2 inches ahead of it——

R. D. Q. 410. In the pipe H?

A. In the pipe H. Then, as I showed you before, with the uniform pressure entirely across the area of the pipe H, the center of the first slug is going to advance or is going to proceed in advance of the material on the periphery of the outside of the pipe—that is, not outside of the pipe, in contact with the pipe. The second slug, that is, the one that has entered the pipe H after the first one has gone along, is undergoing that same procedure. The center is going faster than its periphery. What is happening? The front of your second slug is catching up with the tail end of your first slug, is it not, and your outside is then mixing with that and you do not have any slug.

R. D. Q. 411. When you say "mixing" you mean mixing [fol. 131] with the air in the pipe, do you?

A. I mean the two slugs mixing together, if such a thing were possible, if it were possible for two or three or a dozen slugs to come down one after the other.

R. D. Q. 412. In the actual operation of this structure that you saw in 1903, the machine represented by Figure No. 2 of Exhibit E, did any slugs or wads come out of the exit pipe 16?

A. The only wads that came out of that pipe was when we ran some concrete bags through it.

R. D. Q. 413. And the rest of the time what came out?

A. Just a uniform mass of concrete.

R. D. Q. 414. Liquid concrete or dry concrete?

A. Very liquid.

R. D. Q. 415. Is that also true of the McMichael machine, Exhibit F?

A. I would say that the concrete which we used in the so-called Jackson machine was as nearly identical with what we used in McMichael machine on the concrete.

R. D. Q. 416. And that was what?

A. Very liquid concrete.

R. D. Q. 417. Would any slugs or wads come out of the exit pipe of the McMichael machine, Exhibit F?

A. No, I never saw any.

R. D. Q. 418. And you saw that operated?

A. Yes.

R. D. Q. 419. You were cross examined as to certain air being admitted into the chamber. Do I understand that that mixer on chamber M was shaped like the McMichael patent on Exhibit F with two air inlets, one in the patent marked pipe 8 and the other pipe 10, having its lower end down in the copper and apparently marked 2, although as a matter of fact it has no number?

A. No, there was only the one pipe entering at the top [fol. 132] which I marked No. 1. The addition which we put in was this which was marked No. 2 (referring to Exhibit F).

R. D. Q. 420. If I understand you correctly, then McMichael in 1911 built Exhibit F with only an air opening for air under pressure above the mass; is that all?

A. That is all.

R. D. Q. 421. That is, in 1911, he built this machine, Exhibit F, without two air lines as, for example, in his patent pipe 8 and pipe 10. In other words, he only added the equivalent of pipe 8; is that right?

A. Yes, he had only the one pipe at the top, that is, the one air pipe coming in at the top of the machine.

By Mr. Cox:

R. X. Q. 422. And that is the machine he had been using for grouting?

A. That is the same machine we used on the other side of the river.

By Mr. Johnson:

R. D. Q. 423. But you used this also for concreting, did you not?

A. Yes, sir.

R. D. Q. 424. Simply by adding gravel to the mixture?

A. We use stone.

R. D. Q. 425. Of how big a diameter?

A. The diameter was limited to one inch.

R. D. Q. 426. There was no difference in the structure at all after you added the lower jet 4?

A. No difference.

R. D. Q. 427. And after you added the lower jet 4, inserted or added to the McMichael construction, Exhibit F, then you could use it for wet concrete?

A. Yes. As I stated before, we had trouble with the grout clogging down here in this pipe P right here at the [fol. 133] elbow when the machine was used on the other side of the river. That pipe P, when we first used it, was a spiral, what we called a spiral riveted pipe like galvanized iron. Of course, it was not very heavy, and naturally it wore out. So when this elbow was made as a special casting, as we term it, this connection No. 4 was put in. It would have been utterly impossible to put this in the galvanized pipe and make it tight.

R. D. Q. 428. Somewhere in your cross examination, you were asked about the statement that in your affidavit you said this opening G was four inches, and I think in your testimony you said it was six inches and Mr. Cox contrasted your affidavit of June 8th, 1926, with your testimony of yesterday. I hand you your original affidavit of June 8th, 1926, and ask you who made that sketch in paragraph 11?

A. I made that sketch myself.

R. D. Q. 429. The sketches in portion of paragraph 11. Whose writing is this? Whose lettering is it on this sketch?

A. That is mine. I did those.

R. D. Q. 430. Whose notation is "4 inches or 6 inches about"?

A. That is mine.

R. D. Q. 431. I will therefore ask you if figure 2 of Exhibit E does not correspond absolutely with the sketch that you made yourself in your affidavit of June 8th, 1926?

A. It does in that except we added that goose-neck to it yesterday at the end of pipe H as a continuation of pipe H.

R. D. Q. 432. I will then ask you if there is any contradiction in your affidavit and your drawing and your testimony about 4 or 6 inches.

[fol. 134] Mr. Cox: I object to that. That is all on the record.

Mr. Johnson: I want to bring it out; that is all.

The Court: Overruled. You may answer.

A. I stated yesterday that I said that that was 4 or 6 inches, and when I looked back and remembered that we

shot cement bags through it, cement bags are a pretty bulky proposition, and it is more or less difficult to run one of those things through a four inch, I would say six inches was the size of that pipe, of that opening G.

R. D. Q. 433. Mr. Cox has also cross examined you as to your fee in this case, the inference being of course clear. Have you a standard fee for your services by the day, per diem?

A. I have, yes.

R. D. Q. 434. And what is that?

A. $100 a day and expenses.

R. D. Q. 435. Was that the fee paid you by me last spring when I went over this matter with you?

A. Yes, sir.

R. D. Q. 436. Were you paid anything else?

A. Not a thing.

R. D. Q. 437. Is that the fee that you will receive for coming here, giving up your business and coming here and testifying in this case?

A. That is the fee I expect to receive.

R. D. Q. 438. And nothing else?

A. Nothing else, no.

R. D. Q. 439. Now, you were also cross examined about a portion of your affidavit, as I remember it, in which you mentioned 80 to 100 pounds being applied as air pressure, [fol. 135] and then I think you said 80 to 100 pounds in your testimony, and then Mr. Cox pointed out somewhere in your testimony you said 35 to 50 pounds air pressure.

Will you please explain that? Is that contradictory or not?

A. No, I think you just twisted it.

R. D. Q. 440. Just straighten it out then.

A. It was not contradictory at all. Both of them are right.

R. D. Q. 441. Will you explain that?

A. In my affidavit I said 60 or 80 to 100 pounds pressure. In my testimony yesterday, as I recollect, I said 35, 40 or 50 pounds pressure. That is perfectly proper. They are not inconsistent at all, because if I have 100 pounds pressure in the pipe J it does not necessary follow that I am going to put 100 pounds pressure in the cylinder B. I can explain that very clearly with a certain object. Just take

an inkwell, your Honor, and put 100 pounds pressure on the top of your rubber. It does not necessarily mean I am going to put 100 pounds pressure per square inch on the bottom of the inkwell, or to take it further than that, I mean I could take a lead pencil here and press on the bottom of that and my finger is indented, whereas, on the larger end of the lead pencil there is no indentation at all.

In other words, the pressure on the top is greater per unit of area than it is on the bottom, and so there is no inconsistency at all in the testimony as against the affidavit.

R. D. Q. 442. Do you remember that I asked you out in Chicago if you knew of anyone that would have drawings [fol. 136] of this machine Figure 2 of Exhibit E, and you gave me the name of an old gentleman that I went to see. I do not know his name. What was his name, do you remember?

A. I gave you the names of two. I gave you the name of Mr. John P. Fanning and Alfred Slade.

R. D. Q. 443. Yes, it is Mr. Slade.

A. S-l-a-d-e.

Mr. Johnson: Now, this is a statement, and I do not know whether you wish me to go on the stand or not.

I called on that old gentleman and he had no records back that far.

Mr. Cox: I must object to that.

Mr. Johnson: He gave me the name of this gentleman, and he said the records did not run back that far.

Mr. Cox: How about his memory?

Mr. Johnson: He did not remember; there was some use there.

Mr. McCaleb: He said there was something used there?

Mr. Johnson: He said there was a concrete machine used but he had no drawings of it, and he was a little hazy on the memory.

R. D. Q. 444. The other person was Mr. Fanning?

A. Mr. Fanning.

R. D. Q. 445. And he is here in the room?

A. He is present, yes.

Recross-examination.

By Mr. Cox:

Mr. Cox: My objection to Mr. Johnson's statement, as I understand it, stands but I just simply want it on the record [fol. 137] that that statement has been made.

The Court: If you object to it, I will strike it out.

Mr. Cox: I simply want the record to remain that he has made that statement, and I suppose the objection to it as evidence will be sustained.

The Court: I will strike it out if you want me to.

Mr. Cox: I would rather have it on the record.

The Court: All right; do not object to it.

Mr. Cox: My objection is simply that I do not want it to be part of any evidence in the case.

The Court: Strike it out then.

Mr. Cox: All right, let us strike it out and be done with it.

The Court: All right.

By Mr. Cox:

R. X Q. 446. Do I understand you to say now, Mr. Artingstall, that you shot cement bags through that Jackson machine that you say was used in 1903?

A. I said we shot, yes, we shot I think it was two bags through at one time. The first one went through as an accident.

R. X Q. 447. Now, did they shoot cement bags through the McMichael machine in 1907?

A. Yes,—no, 1911.

R. X Q. 448. Well, I understood you to say they shot cement bags through the McMichael machine in the Drake machine shop?

[fol. 138] A. Yes, that was in 1911.

R. X Q. 449. We were talking about 1907 when you said you saw some tests made in the Drake Machine Shop.

A. That was 1911.

R. X Q. 450. You now say that was 1911?

A. Yes.

R. X Q. 451. That you saw the experiments made in the Drake machine shop?

A. Yes.

R. X Q. 452. And you did not see any experiments made before 1911?

A. No, I did not see any in 1907, no.

R. X Q. 453. You did not see any before 1911 in the Drake machine shop?

A. No.

R. X Q. 454. Did not you say in your affidavit made in this case in June of the present year that:

"I knew John H. McMichael, patentee of United States patent No. 1,127,660, and saw him experiment with his pneumatic concrete machine placer in the plant of the Drake Machine Company on Western Jackson Boulevard, Chicago, Illinois"?

A. Yes.

R. X Q. 455. You made that statement?

A. Yes.

R. X Q. 456. Now then, in your statement made at the meeting of the Western Society of Engineers you stated that that was in 1907 and 1908, did you not? I show you a copy of that statement or I will read it to you.

A. Oh, I do not say in there that I saw those experiments in 1907 or 1908.

R. X Q. 457. Well, you do say, "from that time on it was dropped until about 1907 or 1908 when the Drake [fol. 139] Machine Company here in Chicago took it up and started to improve it"?

A. Yes, I made that statement.

R. X Q. 458. You stated on cross examination that that work was done by McMichael?

A. Oh, no, no, I did not. I said I saw this machine.

Mr. Johnson: Which one?

The Witness: Called Exhibit F in the Drake machine shop in 1911.

R. X Q. 459. Did you say on cross examination that the experiments or tests that you saw in the Drake machine shop in 1907 or 1908 were McMichael's?

A. No; I did not. I did not mention 1907 or 1908 anywhere on this thing.

The Court: What is that machine shop called?

Mr. Cox: Drake. I will refer according to the record.

R. X Q. 460. Now, Mr. Artingstall, I understand it to be your testimony now that the machine that McMichael used for grout on that LaSalle Street job was a machine without any bottom air inlet?

A. I do not say that. I said that the one which he delivered to us had the pipe P of a spiral riveted pipe. There was no air connection to that section of the pipe at all.

R. X Q. 461. Well, your testimony is that there was a top air inlet only on the machine used for grout on that LaSalle Street job, was there not?

A. Yes.

R. X Q. 462. And that is the only machine that was used [fol. 140] on that job for grouting, a machine with a top air inlet only?

R. X Q. 463. Do you mean of this type of machine? That is an air or conveying machine.

R. X Q. 464. Yes, an air machine.

A. Yes.

R. X Q. 465. That is correct?

A. Yes.

R. X Q. 467. Did not you say in this article that has been offered in evidence, the Journal of the Western Society of Engineers, November, 1911, under the heading, "LaSalle Street Tunnel," page 919, "The top was fitted with a hopper for the materials and separated from the mixer proper by an air-tight valve. When the hopper was emptied this valve was closed and compressed air admitted at the bottom, the top of the chamber and the junction of the latter with the 6 inch spiral riveted discharge pipe"?

A. I probably did, for this reason——

R. X Q. 468. You probably did?

A. Yes.

R. X Q. 469. That is all I want to know.

Mr. Johnson: Let him give his reason for it.

The Witness: My reason was this: At no point through any paper that I have ever written or any article or any time on which I have spoken to any society have I attempted to minimize what some other man has done.

In this same article I am giving credit to Messrs. E. C. and R. M. Shanklin for design of the river section which I had anticipated for two years before and applied for and got specifications.

[fol. 141] HARRY B. KIRKLAND, called as a witness on behalf of the defendants, being duly sworn, testifies as follows:

Direct examination.

By Mr. Johnson:

Q. 1. Mr. Kirkland, will you give your name, age, residence and work?

A. Harry B. Kirkland, I am 45, I live in Evanstown, Illinois; chief engineer of the Concrete Mixing & Conveying Company.

Q. 2. That is the plaintiff in this case?

A. Yes, sir.

Q. 3. How long have you been connected with them, sir?

A. Since 1913.

Q. 4. Did you ever write an article that was read before the Western Society of Engineers entitled, "The Pneumatic Method of Concreting"?

A. Yes, sir.

Q. 5. I show you the Journal of the Western Society of Engineers which has been marked for identification as Exhibit H, and ask you if that is the article that you wrote (handing magazine to witness)?

A. Yes, sir.

Q. 6. Do you know Mr. Artingstall who has just testified?

A. Yes.

Q. 7. He took part in the discussion of your paper?

A. Yes, sir.

Q. 8. This article described the pneumatic machines that your company was putting out and had manufactured?

A. Yes, sir.

Q. 9. It described the plaintiff's commercial machine?

A. Yes.

Q. 10. I mean the commercial machine of the plaintiff in this case?

A. Yes, sir.

[fol. 142] Mr. Johnson: I introduce in evidence now this Journal of the Western Society of Engineers of May, 1918, Volume 23, No. 5, copyrighted in 1918, and certified by the Secretary of the Journal of the Western Society of Engineers.

Mr. Cox: I object to this article for the reason that it is an attempt to introduce something to vary or affect the interpretation of the patent, in the form of a statement made by some person who was not speaking for the patentee, and speaking after the patent was issued. He is not shown to have represented the patentee at all.

Mr. Johnson: The evidence shows, your Honor, that he was the chief engineer of the plaintiff; in fact, this article says he is president and chief engineer of the Concrete Mixing & Placing Company of Chicago.

The Court: Is that the same company?

Mr. Johnson: Yes, that is the same company.

Q. 11. Is that the same company?

A. No, sir.

Mr. Cox: It is not the same company.

The Witness: No, sir.

Q. 12. What relationship has that company?

A. The Placing Company was a licensee of the conveyors.

Q. 13. Was it the sole licensee of the plaintiff company?

A. No, sir.

[fol. 143] Q. 14. Who was the other licensee, the Ransome Company?

A. Not at that time.

Q. 15. Did you have any other licensees at that time?

A. I think we did.

Q. 16. You testified in the Ulen suit, did you not?

A. Yes.

Q. 17. As to the operation and construction of the machine?

A. Yes.

Q. 18. And you testified as the chief engineer of the plaintiff company, did you not?

A. Yes, sir.

Q. 19. And you testified as an expert having a knowledge of the construction since 1913, did you not?

A. Yes, sir.

Mr. Johnson: Now, I offer it again.

Mr. Cox: This was a statement made by this witness when he did not represent the plaintiff, the patentee or the owner of the patent.

The Court: What is the purpose in offering this?

Mr. Johnson: It contradicts every contention that they make in this suit.

Mr. Cox: Of course, we deny that.

Mr. Johnson: Every contention is practically denied in this paper by the chief engineer of their company before any suit was started anywhere.

Mr. Morgan: It has an important bearing on the true principles of all these machines, and it is very illuminating as to the attitude of this plaintiff before the stress of any litigation.

Mr. Johnson: It is absolutely necessary to show the [fol. 144] different propositions and legs that they have stood on, here they have to take a different position from the other suit, and in that position they are met flatly by this article by their own chief engineer, and a man who has been with them since 1913.

The Court: I will overrule the objection.

(Magazine marked Defendants' Exhibit H.)

Cross-examination.

By Mr. Cox:

X Q. 20. Now, Mr. Kirkland, I would like you to examine this article which has just been offered in evidence and state whether there is anything in that article that you wish to explain to the Court.

A. Well, on page 325, I think it is an explanation of the process at that time when this was written and I had assumed that the concrete was merely dropped in the air and was conveyed on the air, but as time went on and we made more of a study of the proposition I became convinced that this was not a mere flotation process, but a pressure process.

That is actually the way it looked as I see it now.

X Q. 21. And subsequent to the delivery of this paper by you in 1918 did you make a study of the patents, the McMichael patent in suit?

A. Yes, sir.

X Q. 22. What has that to do with the tests which caused you to arrive at the conclusion just stated?

A. The fact that the air impinging upon the sub-masses of materials as they came from the hopper began to make [fol. 145] us see that it was not merely a flotation process, but was entirely a pressure process. Is that what you mean?

X Q. 23. Did you in connection with the study of the operation of the machine have your attention called to the statement in the Patent Office by McMichael during the prosecution of the application for the patent in suit in which he says, speaking of his apparatus:

"The air can act on the mass only by pushing bodily against large portions of it, and not by acting separately on the individual particles which comprise the mass"?

A. Yes, sir.

Mr. Johnson: What page is that?

Mr. Cox: I read that from the file wrapper of page 267 of the Ulen record.

Redirect examination.

By Mr. Johnson:

R. D. Q. 24. Just what do you mean by your last answer, Mr. Kirkland?

A. I meant I had my attention called to that part he quoted.

R. D. Q. 25. Well, suppose you did have your attention called then, what then?

A. Well, that indicates very plainly that it was a pressure process and not merely a flotation process.

R. D. Q. 26. Oh, then, as I understand you, it was your opinion that it was a flotation process as you contend, but you have changed your opinion in view of something that [fol. 146] occurred in the file wrapper in the Patent Office?

A. Well, up to that time I will not say that I had a very strong opinion about how the machine worked. We were engaged particularly in making the machine work commercially and up to that time I just merely assumed it was that without going into it.

R. D. Q. 27. Now, that we may settle down, Mr. Kirkland, and understand exactly any change that you have and the

different position now assumed by the plaintiff, will you tell me and point out just exactly what portion of your article in the Journal of the Western Society of Engineers, Exhibit H, you now repudiate?

A. Well, that part referring to the method.

R. D. Q. 28. I will have to ask you to point out specifically because I want to know just exactly what it is.

A. Well, it is on page 325 I said, beginning with the second paragraph on that page: "In loading the mixer the ingredients"——

R. D. Q. 29. Now, how far is it?

A. The rest of that page and to the end of the paragraph on the next page.

R. D. Q. 30. The end of the paragraph on page 326?

A. Yes.

R. D. Q. 31. The article is all right with that exception?

A. There might be other statements in here that I would not agree to now. I would have to read it through carefully.

R. D. Q. 32. I am sorry to bother you, sir, but it is very necessary to know just exactly what you now repudiate.

A. I think that is all unless there are some other statements in there that I have not read.

[fol. 147] R. D. Q. 33. Please look through it, Mr. Kirkland, so we will not have to thrash over the same ground again.

A. I think that is all.

R. D. Q. 34. Now, if I understand you correctly then, sir, the only portion of this article of yours entitled, "The Pneumatic Method of Concreting," appearing in Exhibit H, Journal of the Western Society of Engineers for May, 1918, and on pages 319 to 355 is the portion that you have designated on pages 325 and 326 as follows. I will have to read this into the record:

"In loading the mixture the ingredients, cement and water are usually placed in a measuring hopper so that when the hopper is emptied into the mixer the first commingling of the ingredients takes place. This first commingling is not particularly important, as it is very slight. When the air is turned on that portion of the batch, which is at the bottom of the mixer, in front of the conveying air jet, is first to move and is instantaneously followed by por-

tions dropping from above. As the mixer has the shape of an hour glass, the central portion of the batch in the mixer flows down first, and the portion in the sides follows in the stream from the upper part exactly as sand flows in an hour glass. During this operation the minging of the different ingredient parts causes the smaller ingredients to flow into the voids between the larger ingredients. As the portions of the batch drop into the lower air stream, which [fol. 148] has a velocity of about 5,000 feet per minute, these portions are carried along in suspension much as dust is carried along in a storm, except that the articles are much closer together. Although the speed of the air jet is very high, the speed of the concrete materials is much slower. The speed of the concrete varies according to the amount of voids in the materials which permit the air to pass through. The air in passing through the voids tends to carry with it the smaller ingredients; that is, the sand tends to fill the voids betwe-n the rocks and the cement tends to fill the voids remaining, and, as the voids become filled up with the smaller ingredients passing through, the speed of the mass increases, the pressure of the air behind the mass increases with the decrease of the voids in the mass, and the speed of the mass concrete increases.

"Now, in this explanation of the mixing process, I have assumed that the air velocity passing through the pipe is sufficient to keep the materials in suspension, and it is important to have a sufficient air pressure to keep the materials in suspension, because when the air velocity is reduced the materials simply roll and tumble along the bottom of the pipe. The concrete will also mix in this manner, but it is not conducive to good operation and makes a dirty pipe line, which is liable to become plugged. In shooting concrete, therefore, it will be found that with [fol. 149] an 8-in. pipe and with materials of the specific gravity of limestone, the pressure should not fall below 50 pounds, as the materials will then commence to drag along the pipe. Any air expended below 25 pounds is wasted when blowing concrete through an 8-in. pipe."

That is correct, is it not?

A. Yes, sir.

R. D. Q. 35. Now, you stated, Mr. Kirkland, I believe, that you have been connected with the plaintiff in this action since 1913, is that true?

A. Yes, sir.

R. D. Q. 36. And you were chief engineer from 1913?

A. Yes, sir.

R. D. Q. 37. When did your company first file an infringement suit based on the McMichael patent in suit?

A. Sometime after the war; I do not remember.

R. D. Q. 38. That is some time after 1918?

A. Yes.

R. D. Q. 39. Have you filed more than two suits, one against the Ulen Company and one against the present defendants?

A. Yes, sir.

R. D. Q. 40. Before or after the Ulen suit?

A. After.

R. D. Q. 41. So that the first suit you filed was the Ulen suit, is that right?

A. I am not certain whether the Ulen suit was the first one.

R. D. Q. 42. Well, it was either the Ulen suit or this present suit that we are now engaged in, was it not, one or the other?

A. No, I am thinking of another suit; it may have been filed before; I am not certain.

[fol. 150] R. D. Q. 43. You filed three suits?

A. At least.

R. D. Q. 44. And they were all after 1918?

A. Yes.

R. D. Q. 45. They were all after May 13, 1918, were they not?

A. Yes, sir.

R. D. Q. 46. They were after you read this article. "The Pneumatic Method of Concreting," before the Western Society of Engineers on May 13, 1918?

A. Yes, sir.

R. D. Q. 47. So that you were connected with the plaintiff company as chief engineer for some five years before you wrote this article in Exhibit H, the Journal for the Western Society of Engineers?

A. Yes, sir. You say, "as chief engineer." I was considered as a technical man in the early days.

R. D. Q. 48. You have just stated that you were chief engineer?

A. There was no official title in those early days.

R. D. Q. 49. You watched the operation of your pneumatic blower during the time that you were employed from 1913 up to 1918, did you not?

A. Yes, sir.

R. D. Q. 50. You were familiar with the way it operated?

A. Yes, sir.

R. D. Q. 51. And you had been familiar with it for some five years or more?

A. Yes.

R. D. Q. 52. You testified in this other suit, this Ulen suit, as chief engineer for the plaintiff company, did you not?

A. Yes, sir.

R. D. Q. 53. You are an engineer, are you, Mr. Kirkland?

A. Yes, sir.

R. D. Q. 54. A graduate of what college or school, sir?

A. I am not a graduate; I attended the University of Wisconsin for two years. I was elected to membership in [fol. 151] the Western Society of Engineers in 1910.

R. D. Q. 55. Are you a civil engineer or a mechanical engineer?

A. Civil engineer.

R. D. Q. 56. And you were a civil engineer in good standing between 1913 and 1918?

A. Yes, sir.

R. D. Q. 57. When you wrote this article?

A. Yes, sir.

Recross-examination.

By Mr. Cox:

R. X Q. 58. In the portion of this article that has been quoted by defendants' counsel, did you explain what you understood to be the mixing operation of the machine?

Mr. Johnson: I object to that, your Honor. It seems to me that the best evidence of that is this printed book itself. That is what he thought at that time.

The Court: I think it is. You examined him and cross examined him, and I will let him answer, but hurry up.

A. Yes, sir.

R. X Q. 59. And previous to that time in connection with the Wilson Avenue Tunnel, had you operated the machine without pre-mixing the ingredients?

A. Yes, sir.

R. X Q. 60. And what was the result of that operation?

A. The concrete came out well mixed.

R. X Q. 61. Was that what led you to assume that there was some mixing going on in the machine?

A. Yes, sir.

R. X. Q. 62. Can you say whether there was any mixing [fol. 152] that goes on in the discharge conduit, and if so, how?

A. Well, in that turbulent motion in the sub-masses as they move through the pipe, or as they pass through the pipe.

R. X. Q. 63. And where else does mixing occur in the machine? I mean is that all the mixing, or does mixing take place in some other stage of the operation?

Mr. Johnson: Your Honor, I do not want to object to this, but the article stands for itself, and it seems to me not what he thinks about it now after he has brought two suits.

The Court: Overruled.

A. Well, as the mass presses itself in front of the jet which detaches portions there must be some commingling in there to cause a beginning of the mixture.

R. X Q. 64. Well, I mean prior to that. You may be confused because I mentioned the discharge. I mean prior to the actual discharge of the contents of the vessel, does mixing take place in the vessel?

A. Well, as soon as the air is turned on it tends to seek the common pressure throughout the chamber, and therefore the air goes up with a violent rush which stirs the material in the machine.

R. X Q. 65. Up through the materials in the vessel?

A. Yes.

R. X Q. 66. And causes a violent agitation of those materials?

A. Yes.

[fol. 153] JOHN T. FANNING, called as a witness on behalf of the defendants, being duly sworn, testifies as follows:

Direct examination.

By Mr. Johnson:

Q. 1. Mr. Fanning, will you please give your name, age, residence and occupation?

A. John T. Fanning; 1128 South Harvey Avenue, Oak Park, Illinois; occupation, contractor and consulting engineer.

Q. 2. Were you ever connected with the Jackson & Cordett Bridge & Steel Works, and if so, in what capacity?

A. I was vice-president and general manager of the George W. Jackson Bridge & Steel Works.

Q. 3. What did that company manufacture? What was its business?

A. Well, they manufactured concrete floorings, steel works, and construction of all descriptions; they took contracts of all descriptions and built bridges and buildings.

Q. 4. How long were you connected with that company?

A. From its inception, I was one of its incorporators from its inception, and it sold out to Mr. George W. Jackson in 1906. From 1901 to 1906.

Q. 5. Did that company do any tunnel work or was it Mr. Jackson that did the tunnel work?

A. The company did tunnel work, too, for Mr. Jackson's office at that time, did all the tunnel work. He was chief engineer and general manager of the Illinois Tunnel Company.

Q. 6. And he was a member of your firm?

[fol. 154] A. He was also a member of the firm of Jackson & Cordett Bridge & Steel Works.

Q. 7. Have you had any practical experience in concrete construction, and if so, please state what.

A. I have had considerable. I have been around where they poured possibly upward of 400,000 yards.

Q. 8. Will you briefly give the location of each job and the yardage approximately you saw of concrete work you were employed on?

A. Well, I would say altogether about one hundred million dollars. That would include the collateral work. There are two open excavations and pile drivings, that would include all of that, but the jobs would amount to about one hundred million dollars.

The largest one was the Illinois Tunnel Company. During the time I was there they poured possibly two hundred thousand yards, and I was also consulting engineer for Mr. Jackson on his tunnel work, all mechanical operations.

Q. 9. Can you name any other concrete construction work that you were on?

A. Directly under my charge was about 5,000 yards for the City of Louisville; 5,000 for the Illinois Central Railroad Company; about eight or nine thousand for the Chicago & Northwestern Railroad Company. The Ford Motor Company, I was there during the time and examined and watched concrete there for 60,000 yards approximately, spending three years on it.

There were numerous small jobs, such as bridges, foundations and so forth in the City of Chicago, the North Avenue Bridge, the Randolph Street Bridge in connection with [fol. 155] the Northwestern. Quite a few jobs that come to my mind right now.

Q. 10. The jobs you are mentioning now are concrete jobs?

A. They are concrete. There was also a job I did for the Sanitary District, concreting in the crossing between Evanston & Wilmette, and also the bridge for the Milwaukee Electric crossing between Evanston and Wilmette. I put the foundation in for that.

Q. 11. Have you had any practical experience in pneumatic placing of concrete?

A. Some.

Q. 12. Please state what experience you have had in pneumatic placing of concrete?

A. Well, in the year 1901 Mr. Jackson asked me to come over to his office one night, and told me he was having a little trouble with leakage of air in the tunnel. The tun-

new as constructed under air; and he thought if he could get concrete behind or grout behind the concrete, he could plug up those leaks.

I told him in 1898 or 1897 I had built a machine for blowing wet sand, and I believed if I could blow wet sand, I could blow wet sand with concrete and cement in it, which was grout. So he told me to go ahead and see what I could fix up, so I got a little tank and put some valves on it and some pipes and attached air to it and tried it.

Q. 13. Did you make an affidavit in this case on June 8th, 1926?

A. Yes, sir.

Q. 14. There are certain sketches in your affidavit that I will ask you to examine and state whether you made those sketches?

A. I made them.

Q. 15. I have had a court exhibit made, and will ask you [fol. 156] whether or not the drawings on this court exhibit are identical except for size with the three sketches that you made yourself in the affidavit of June 8, 1926?

A. They are.

Mr. Johnson. For the sake of ready reference I am having Fig. 3 placed on the first sketch, Fig. 4 on the second, and Fig. 5 on the last one.

Q. 16. Will you please testify exactly what was the first pneumatic blowing of concrete or grout that you did, and indicate on this court exhibit if any of these sketches properly illustrate the machine you built at that time?

Mr. Johnson: There is no objection to offering this now before I examine this witness, is there?

Mr. Cox: He has identified it, has he not?

Mr. Johnson: Yes. The court exhibit just referred to is offered in evidence.

(Marked Defendants' Exhibit 1.)

A. The first one built was Fig. 3 on the exhibit.

Q. 17. You are talking about this one (indicating)?

A. Yes, but it did not prove very satisfactory.

Q. 18. Will you please describe in detail exactly how the machine illustrated by Fig. 3 operated and how you

used it, using proper designating letters or numerals. You had better come down here and put it on.

[fol. 157] A. They mixed grout separately from the machine, and then poured it into the machine in valve B so it went into the tank A.

The Court: Well, now, what is the Fig. 3? I mean he has three figures. What about 3?

The Witness: The Fig. 3 means this type of machine.

The Court: Is that the first one you made?

The Witness: That is the first one I made, yes; that is the first one. Then we opened valve B, and the air carried the grout out as far as it would, but we found there was quite a lot there that stayed in on account of the concave bottom.

Q. 19. Lettered what?

A. Tank A.

Q. 20. The concrete bottom?

A. The bottom of the tank.

Q. 21. No. 20?

The Court: So you made a convex one?

Mr. Johnson: That is the idea, yes, sir.

The Witness: So we then stopped immediately and reversed it as per Fig. 4. That operated a little bit different, but we found that the air had a tendency to keep the grout from falling fast enough. It would take particles, and it took quite a few operations to shovel it out. We decided we had to have a pressure on the top of the stuff to [fol. 158] push it down, then we made Fig. 5.

In this machine this stuff is mixed first and poured. What I was getting at, in this valve we found the top of the valve stopped up.

Q. 22. Please refer to the letters now.

A. Valve D.

By Mr. Morgan:

Q. 23. In Fig. 3?

A. Also valve D in Fig. 4, and then we decided to put a gate or door in the top of the tank. We had a new tank made and shelves rolled by the Superior Boiler Works on Mandell, just west of Cortlandt, and we took it to the

shop and punched it and riveted it and made it into a tank.

By Mr. Johnson:

Q. 24. You will have to be more specific, Mr. Fanning.

A. In what way?

Q. 25. I want you to take first your machine shown by Fig. 3 and state just exactly how you operated it, and what were the materials that you used, the pressure you used, and how you shot the grout or whatever you used. Please refer to the different letters as you go along.

A. All right.

Q. 26. And the dates.

A. I do not want to give the exact date; it was the latter part of 1901.

Q. 27. That you built the machine shown by Fig. 3?

A. Yes.

Q. 28. All right. Start from that.

A. Then we mixed grout separate in a box and poured it through this valve into the tank.

[fol. 159] Q. 29. What valve?

A. Valve B into Tank A. Then we opened valve C and shot the grout out until no more would come. Then on examination we found that most of it stayed up in the tank. It would not come out, and we decided that was on account of the shape of the part No. 20.

Q. 30. What did you shoot it out with?

A. Air; compressed air.

Q. 31. Under what pressure?

A. We had about seventy pounds or eighty pounds pressure; sometimes it varied. We had a pressure on the one which was only the reaction the concrete would give to it. The air expanded as you opened the valve because there is no pressure ahead of it. What the exact pressure was, I could not tell because we never put a *guage* on.

Q. 32. You say you blew your grout?

A. Yes.

Q. 33. In this first machine, Fig. 3?

A. Yes, sir.

Q. 34. What do you mean by grout?

A. A mixture of sand, cement and water.

Q. 35. About the consistency of what?

A. Well, so as to pour out of a bucket.

Q. 36. Thick cream, or something like that?

A. A little heavier than that, possibly very thick cream, like tar.

Q. 37. What was the diameter of the pipe that you have marked No. 21 on Fig. 3?

A. On the original machine that was a four inch pipe.

Q. 38. What was the diameter of the discharge pipe on Fig. 2?

A. That was a two inch pipe on the original.

Q. 39. How far did you shoot this grout in this first machine?

A. About twenty feet. We were trying to line, that is to get the grout back of the lining of a tunnel. The air was [fol. 160] getting out; the tunnel was constructed under compressed air, and we would find leaks, so Mr. Jackson decided that if he could get some grout back of that concrete it would plug those leaks up, so we made the machine for that purpose. We would go where we discovered a leak and drill a hole and insert a pipe, and connect this machine, put the air pressure on, and shoot the grout in there until it would not go any further.

Q. 40. Then, as I understand you, the tunnel was the first lined with concrete, and you used this machine shown in Fig. 3 to shoot grout back of previously set concrete; is that right?

A. That is exactly right.

Q. 41. What was the next step in the evolution of the pneumatic conveying of concrete as shown by these different figures?

A. The tank——

Mr. Cox: I think Mr. Johnson should not use the word "concrete." The witness is talking about grout, something essentially different.

Mr. Johnson: I am willing to say grout.

A. (Continuing:) The machine was not satisfactory, and we decided it was because the bottom was of wrong shape. We took the tank and reversed it.

Q. 42. As shown in Fig. 4?

A. As shown in Fig. 4, and did the same thing. While it worked better, it still was not satisfactory, and we operated exactly the same way as in Fig. 3.

Q. 43. Now, I want you to go a little more in detail.

[fol. 161] The Court: In what respects was it not satisfactory?

The Witness: The material would not all come out of the tank; most of it stayed in there.

The Court: All right.

Q. 44. Mr. Fanning, I want you to give a little more in detail how you operated it. What was the size of this opening, No. 23?

A. Four inches.

Q. 45. On Fig. 4?

A. Four inches.

Q. 46. What was the size of the discharge pipe, No. 24?

A. Two inch discharge pipe.

Q. 47. What was the size of the air pipe, No. 25?

A. One inch.

Q. 48. What air pressure did you use?

A. About sixty, between sixty and eighty pounds at all times.

Q. 49. And when did you use this machine, Fig. 4?

A. That was about the first of 1900, or the latter part of 1901.

Q. 50. Where did you use it?

A. In the Illinois tunnel, City of Chicago.

Q. 51. When?

A. In 1902; I would say the first part of 1902.

Q. 52. The first part of 1902?

A. Yes.

Q. 53. What does Fig. 5 on Exhibit I represent?

A. Fig. 4 was not quite satisfactory. While we could put grout in, still it was slow and we were bothered with the plugging up, and very often it would shoot right through. By the time you got so that you could work the stuff, it would be set in there, so that we had to shape it out. Then we thought of another plan, that is, putting pressure on top. So then we designed or added, rather, Fig. 5.

[fol. 162] Q. 54. You designed Fig. No. 5?

A. Yes, sir.

Q. 55. When?

A. In 1902, the latter part of 1902 or the first of 1903, I would not want to say just exactly when; not later than 1903 and not before 1902.

Q. 56. Will you describe in detail exactly this construction of Fig. No. 5, using the reference letters on the sketch or figure and adding any others that you see fit?

A. Tank A was made with a cone shaped bottom——

Q. 57. No. 26?

A. Yes, sir, and had a door cut in the top.

Q. 58. That is, door B?

A. Door B put in the top. Airpipe 27 was connected to the air pipe that lead from the main air line which was controlled by valve C in pipe 27. We also had a pipe leading from the end of the main line 28 into T-29, which connected to the cone part of the tank and also to the delivery pipe H. We then would mix the grout in the same manner as stated on the other one, pour it in the tank, fasten down the top B, open valve C, and immediately thereafter valve E, until the contents were discharged.

Q. 59. Do I understand that you had pressure above the mass of grout in the chamber A and then also you used pressure down through the nozzle or fitting 29, so as to blow the grout out of the discharge pipe H?

A. Yes, sir.

Q. 60. When did you first blow grout with this machine shown in Fig. 5?

A. About the latter part of 1902 or the first of 1903; I would not want to say positively, but in there some where.

Q. 61. Where?

A. In the Illinois Tunnel, City of Chicago, in what we [fol. 163] call the Powers-O'Brien shaft. In other words, we took the material for that shaft in under Powers and O'Brien's basement. They had a place on Madison Street. We took it through the basement down into the shaft and tunnel. We used the basement for mixing.

Q. 62. Have you any way of fixing the time?

A. The only way I can fix the time is at that time we were engaged in the structure of the 18th Street Bridge, and that is during the time of the construction of that bridge.

Q. 63. You have testified, as I understand you, that this structure of Fig. 5 was used for placing grout in the Illinois Tunnel?

A. Yes, sir.

Q. 64. Was it ever used for any other purpose?

A. Yes, sir. We found a great deal of trouble occurring in the key of the arch. It was the hardest place for us to place concrete in the entire section. We found that the hardest part of placing the concrete was in the key or the top of the arch. The tunnel was horseshoe placed, and we got talking one day and I said, "I don't see why the addition of a few stones would stop that stuff from coming in. I believe if we push that concrete into the key under pressure that we would stop a lot of that trouble."

We tried it out and did it, placed the concrete there, but it did not stop the leak any better than the grout we were using. But we mixed it up with an addition of three-quarter inch gravel, mixture 1-2-4, and shot it in at the top of the form into place after the walls had been run up to the key, what we called the key.

Q. 65. After you added the gravel that you referred to, what was the mixture then?

[fol. 164] A. Concrete.

Q. 66. At first you used this structure as shown in Fig. 5 for grouting——

A. Originally designed for grouting.

Q. 67. And you used it for grouting?

A. Yes, sir.

Q. 68. Then later you used this same identical machine of Fig. 5 with concrete to put in the key or the arch of the tunnel?

A. Yes, sir, we did.

Q. 69. When did you do that?

A. We did that the later part of 1902 or the first of 1903, about the same time along there through that term of work.

Q. 70. You gave a certain mixure there a minute ago by numbers. What did you mean by that?

A. For portions.

Q. 71. Please give it.

A. I say 1-2-4. I mean 1 is the proportion of cement, 2 the proportion of sand and 4 the proportion of gravel.

Q. 72. How big was the gravel that you used to make this wet cement?

A. What is known as three-quarter inch.

Q. 73. Was this machine ever used in placing concrete pneumatically other than placing the arch in the tunnel?

A. It was used at 177 and 179 East Monroe Street, old numbers, City of Chicago, in the basement for putting concrete in the underpinning and the floor.

Q. 74. Has that machine of yours, Fig. 5, any resemblance to the Fig. No. 2 of Defendants' Exhibit E?

A. Practically the same thing.

Q. 75. They are both meant to represent the same machine?

A. Yes, sir, I would say so; supposed to represent it in [fol. 165] the same manner; the operation in the same manner.

By the Court:

Q. 76. Mr. Fanning, have you got any drawings made at the time of this machine?

A. There were no drawings made, Judge, only pencil sketches by me.

Q. 77. Have you got them?

A. No, I have not. That was 25 years ago. Mr. Jackson may possibly have drawings made, but in 1917, I think it was, he was in the building—Mr. Jackson had the misfortune of going into bankruptcy, and he rented a little shop there and tried to start to build some stuff, and he did not have money enough, and they seized everything he had, all his plans and cuts and pictures. He had a lot of pictures and stuff. That all disappeared.

Q. 78. You have not continued the same concern in any way? You did not buy it out?

A. No.

Q. 79. You have nothing to do with that old Jackson concern?

A. I was with him until he failed. I sold out in 1906 and Mr. Jackson organized what is known as George W. Jackson, Incorporated, and the latter part of 1906 he asked me to come back with him. He asked me if I would undertake to supervise some cribbing work, which I did. I stayed with him up until the time he could not go along any longer.

Q. 80. Then what did you do after that? Did you continue the contracting business or the engineering business?

A. The engineering and contracting business.

[fol. 166] Q. 81. You have your own concern now?

A. No, I am with the Central Dredging Company.

Q. 82. That is in Chicago, is it not?

A. That is in Chicago. They are a Cleveland concern, but they have got offices in Chicago. We are doing a lot of work there.

By Mr. Johnson:

Q. 83. Do I understand from your testimony that you personally gave instructions for the building of this machine in Fig. 5?

A. I personally gave instructions for the building of that machine. We had our own shops on Mendell Street, and I personally gave the instruction for the building of the machine. The tank was built and the other parts, of course, was stock stuff, was bought and delivered to the tunnel and assembled there.

Q. 84. Have you testified what other use was made of this structure, Fig. 5, other than putting the arch in?

A. Yes, the floor.

Q. 85. When was that?

A. That was the first of 1903, I would say.

Q. 86. Is that the same job that Mr. Artingstall just testified to?

A. It must be, because there was no other that I know of.

Q. 87. That testimony as I remember it, was for a floor, and the Judge asked why it could not be done by hand with funnels to direct the flow of concrete?

A. It could.

Q. 88. Why wasn't it?

A. Mr. Jackson was using a peculiar type of mixer at the time. It was an oblong box with spiral arms on a shaft that revolved, and they were very heavy and clumsy to remove. [fol. 167] This being a small amount of concrete to put in, it did not pay to rig up anything fancy, and he had the machine and thought he would like to try it.

Q. 89. On this concreting job in 1903 at 177 Monroe Street——

A. 177-179 East Monroe Street, old numbers. The numbers have been changed since then.

Q. 90. What mixture did you use in this structure?

A. I believe 1-2-4.

Q. 91. What did you mean by that?

A. One portion of cement, two portions of sand, and four portions of gravel.

Q. 91. And the mixture then was——

A. Concrete, what is known as concrete.

Q. 92. Wet concrete?

A. Yes, sir. Water was added to the consistency that it was thought best to use.

Q. 93. How far did you blow it on that job?

A. I would say seventy feet.

Q. 94. Could you have blown it any further?

A. From what I have learned since, we could have blown it considerably further. At the time we did not know how far we could blow it. We had never tested it out. We did not know just what it would do. From what I have learned since, I think we could have carried it a thousand feet. I have seen it carried a thousand feet.

Q. 95. When was the last time that you saw this structure that you testified to in Fig. 5?

A. The last time was on Madison Street in front of what is known as a disposal station. Mr. Jackson has a disposal station which he took in excavation and also brought the [fol. 168] excavation from the tunnel through to get a shaft. In constructing that shaft, he had a great deal of difficulty with leaks. I was not on that job. I was at South Chicago on the crib, but I understood—I asked him why the machine was around there, and he said they had used it to try to plug the leaks in the shaft. But the machine was on Madison Street——

Mr. Cox: We would have to object to what Mr. Jackson told him as hearsay.

The Court: Yes.

Q. 96. As a practical contractor familiar with concrete construction, what have you to say as to the relative cost of placing concrete pneumatically by such a machine as Fig. 5 or by buggies?

A. We had decided, and so far as my experience has been, that the operation of chutes or buggies, depending on the location, is cheaper than the air system.

Q. 97. Why?

A. The initial plant is expensive on the air system. I have not had any great experience in placing by air, but I have never seen it used on any place to any great extent. I know there are millions of dollars of jobs going every day

that do not use the air system on them. They use either the buggies or the tower system.

Q. 98. In your practical experience, you think that is cheaper than this air conveyor of Fig. 5?

A. Yes, sir; we found it so in putting the concrete in the keys.

Q. 99. That is, after you had this machine of Fig. 5, you found it was cheaper to use the buggy?

A. We used little cars run on tracks.

Q. 100. Do you not call those buggies?

[fol. 169] A. We call those concrete cars. The sides came off so that the concrete would fall off them, men would take shovels and throw it off. We found it cheaper and a better job than we got by blowing it.

Q. 101. Of course, you use the cheaper method, I suppose?

A. It would be cheaper for us, anyway, because we had a number of shafts operating and we would have to put in such a large number of plants that it would run into considerable money.

Q. 102. How much?

A. $30,000 or $40,000. All our compression plants were low pressure plants. We carried only eight to twelve pounds pressure on our tunnel work.

Q. 103. What pressure did you use?

A. We had one small high pressure outfit there, and we connected that up to it. That ran about sixty or seventy pounds. We always put in a small high pressure for running a drill or something of that kind.

Q. 104. So you had two systems of pressure in the tunnel, one low pressure and one high pressure?

A. Yes, sir.

Q. 105. And when you used this structure of Fig. 5, you connected it up with the high pressure?

A. Yes, sir.

Q. 106. That was about what pressure?

A. From sixty to eighty pounds. I would say it averaged seventy pounds at all times. If we were drilling, it would probably run it a little higher; probably eighty or ninety pounds.

(Adjourned to October 6th, 1926; 10:30 A. M.)

[fol. 170] JOHN T. FANNING resumed:

Direct examination.

By Mr. Johnson (continued):

Q. 107. Mr. Fanning, you have mentioned in your affidavit several times George W. Jackson. Is he alive now or not?

A. George W. Jackson is dead.

Q. 108. When did he die?

A. I think it was three or four years the 5th of last February.

Q. 109. In answer to Q. 9 yesterday you stated, referring to the Ford job that you were there during the time. Were you employed on this Ford job laying concrete or were you employed on other work there during that time and saw the concrete work being done?

A. I was employed on other work.

Q. 110. In the operation of this pneumatic concrete laying machine that you built, figure 5 of Exhibit I, and that you used in 1903 to lay a concrete floor at No. 177 East Monroe Street, was the concrete wet or dry concrete?

A. A wet mixture.

Q. 111. You mean by that wet concrete?

A. Wet concrete, yes.

Q. 112. Did the concrete come out of exit pipe H of figure 5 in slugs or as a mass?

A. As a mass.

Q. 113. Is this pneumatic concrete machine shown by your sketch, figure 5 of Exhibit I, as to which you have testified, the same machine that you heard Mr. Artingstall testify to as to his own sketch, figure 2 of Exhibit E?

A. It is the same machine.

[fol. 171] Cross-examination.

By Mr. Cox:

X Q. 114. You were present during the examination of Mr. William Artingstall as a witness in this case?

A. I was.

X Q. 115. During the period that you have mentioned when you say these machines were used, what was your connection with Mr. Jackson?

A. I was mechanical engineer for Mr. Jackson.

X Q. 116. Were you connected with the Jackson-Cordett Bridge Works?

A. I was vice president and general manager of the Jackson-Cordett Bridge Works.

X Q. 117. And what was their business?

A. Contracting, bridge building, form building, concrete forms, steel work of any description and contracts.

X Q. 118. They had a factory outside of Chicago, did they not?

A. At 80 Mendell Street I believe was the address. Not outside of Chicago; inside of Chicago.

X Q. 119. How far from 177 East Monroe Street?

A. About four miles.

X Q. 120. What did you have to do with the work in that job?

A. I had general supervision of all work in the shop and out of it.

X Q. 121. And Mr. Jackson at that time was employed by the Tunnel Company to supervise the construction of their tunnels on a salary, was he not?

A. Just what his arrangements with the Tunnel Company were, I can not tell you. I know he was general manager and chief engineer of the Tunnel Company.

X Q. 122. You were not employed by the Tunnel Com-
[fol. 172] pany?

A. No, sir, by Mr. Jackson personally.

X Q. 123. Your work was looking after the shop which you have mentioned?

A. My work was looking after the shop or any other work which Mr. Jackson gave me.

X Q. 124. That was taken by the Jackson & Cordett?

A. That was taken by the works. I had two salaries, one from Mr. Jackson and one from the Jackson-Cordett Bridge & Steel Works.

X Q. 125. Do you remember whether you visited the tunnel in 1900 and 1901?

A. 1901, yes.

X Q. 126. How about 1900?

A. No.

X Q. 127. What was going on in the tunnel in 1901?

A. They were working on what was known as shaft No. 1, back of Powers & O'Brien's place of business. The shaft was in the alley. Operations were light at that time.

X Q. 128. Where did you say that these three machines that you have testified about were made?

A. Made?

X Q. 129. Yes.

A. Well, the first two machines, I built the tanks and fittings, and we fitted them up, and the valves and all work on them was done in the shop on Mendell Street.

X Q. 130. In the Jackson & Cordett shop?

A. The first tanks were made,—no, in the shop I had on Superior and Morgan. The shop I was interested with my brother in.

X Q. 131. Yes?

A. The last tank was made in the shop on Mendell Street.

X Q. 132. The last two?

A. How is that?

X Q. 133. The last two tanks?

A. The last two.

X Q. 134. Were any of those made at the Jackson & Cordett shop?

A. The last tank was made at the Jackson & Cordett [fol. 173] shop, and the shell was rolled by the Superior Boiler Works.

X Q. 135. And the tank was made up in the shop?

A. The tank was made up in the shop.

X Q. 136. That is the one represented by figure 5?

A. Yes, sir.

X Q. 137. In Exhibit 1?

A. Yes, sir.

X Q. 138. And was that same tank that you said you saw for the last time at the disposal place?

A. At the disposal station on Madison Street.

X Q. 139. I believe there was a machine made as a No. 4, as shown in Exhibit 1, before No. 5, is that correct?

A. There was a modification of No. 4, and it was such a foolish modification that I am ashamed to tell about it.

X Q. 140. Well, I do not want to embarrass you.

A. I will tell you, if you want to know.

X Q. 141. What was it?

A. We put a plate at the top of it thinking by putting the air on top of the plate we could press the concrete out faster or better, but we found in the vernacular it was a lot of apple sauce.

X Q. 142. You do not know what has become of any of these machines or whether any of them are in existence?

A. No, I could not tell you a thing about it. The Tunnel Company might know. They had everything, I think.

X Q. 143. These machines that were made up, were they billed to the Tunnel Company, or did they remain the property of Mr. Jackson or of Jackson & Cordett?

A. That I can not tell you. I bought them under Mr. Jackson's direction, and delivered them where he told me, and whether he claimed them or anything else, I know noth- [fol. 174] ing about it. I presume they belonged to the Tunnel Company.

X Q. 144. You stated that the last time you saw the machine of figure 5 you were working on some other job. What was that job?

A. At 68th Street Crib, the waterworks crib in the lake. That is, I was at South Chicago constructing it for Mr. Jackson.

X Q. 145. Can you fix the date of that?

A. Well, not exact. I would say it was June or July of 1906, along in there.

X Q. 146. You can not fix the date, though?

A. The exact date I saw the machine?

X Q. 147. Yes. How long were you working in that crib?

A. I was there all of that summer.

X Q. 148. Just that summer?

A. Just that summer, yes, sir.

X Q. 149. You worked on the crib?

A. Just that summer, yes, sir.

X Q. 150. Your work on the crib did not have anything to do with Mr. Jackson's work on this disposal place?

A. No, that was a separate contract for a water tunnel for the City of Chicago.

X Q. 151. Do you remember the details of the construction of that Chicago tunnel commonly called "The Illinois Tunnels"?

A. Yes, sir.

X Q. 152. What was the size of the tunnel?

A. The inside of the concrete was six feet by four inches by seven feet, eight inches. The outside was two feet larger each way. It was horseshoe-shaped.

I may be wrong; it may be six feet eight by seven feet four, but those are the approximate dimensions; and they changed at the intersections where they went around the [fol. 175] curve they were widened out some. I am talking about the tunnel proper.

Q. 153. And the work on those tunnels was done under air lock, was it not?

A. Yes, sir.

X Q. 154. That is to say, there was a bulkhead, and the men working on the excavations worked inside of the bulkhead and in advance of it?

A. Yes, sir.

X Q. 155. And the air pressure in that lock was what, would you say?

A. From eight to twelve pounds, depending on conditions.

X Q. 156. When you operated this machine, how did you get the high pressure air through the bulkhead?

A. I had a high pressure compressor in the basement of Powers & O'Brien's.

X Q. 157. How did you run that through the bulkhead?

A. That was done through a pipe, through the air line.

X Q. 158. How did the pipe go through the air line?

A. The usual method with flanges screwed in on one side and out the other.

X Q. 159. They bored a hole through the bulkhead?

A. They bored a hole through the bulkhead and riveted flanges on it, and screwed a pipe on it and screwed on the other side with valves on each side.

X Q. 160. Was this work done preparatory to using the pneumatic machine?

A. No, they had that all the time.

X Q. 161. They had all these air locks and high pressure air pipes?

A. No, they had on this one, that was shaft No. 1. They afterwards built individual compressor plants to run inside the locks to save the big compressor.

X Q. 162. Now, that building at 177 East Monroe Street, [fol. 176] that building was rented or owned by the Tunnel Company, was it not?

A. They leased it, I believe. Just what their arrangements were, I am not positive. Those details I am not positive about.

X Q. 163. They occupied it?

A. They occupied it, yes, sir.

X Q. 164. Mr. Jackson's occupancy of part of that was as an engineer and general superintendent?

A. Yes, sir.

X Q. 165. I believe you are unable to state whether Mr. Jackson had any drawings made of this machine at the time?

A. I am unable to state that positively. He had none made in my office, I know.

X Q. 166. Well, Mr. Jackson had a great many ideas, didn't he?

A. Yes, he had a number of them.

X Q. 167. He was a man who invented a great many things?

A. Quite a few.

X Q. 168. And patented quite a few?

A. He took out quite a number of patents, I believe.

X Q. 169. Now, I want to clear up this point. How long were you with Mr. Jackson? That is to say, when did you first separate from him in business?

A. The first separation was in 1906.

X Q. 170. Yes, and the next?

A. I went back with him again in 1906 to take care of the crib work for him.

X Q. 171. Yes, and how long were you with him then?

A. I think about six months.

X Q. 172. Now, I believe you said that it was hard to place the key of the tunnel lining by hand?

A. Why, it was the most difficult part of the concreting, that is what I meant, because it is in a confined place, and [fol. 177] they have to throw it up over their heads, and throw it in back.

You understand, as they concrete the sides they leave the lagging plates off until they fill the concrete to the top of the lagging plates in place, and then keep adding lagging

plates as they go up until they come to a confined place called the key. That of course is a little more difficult, and they have only about twelve inches to place that in.

X Q. 173. That might be called the keystone of the arch?

A. That might be called the keystone of the arch, yes.

X Q. 174. And the floor and sides of the tunnel and the roof up to this key were all placed by hand?

A. At first, yes.

X Q. 175. And was the concrete rammed in?

A. Yes, sir.

X Q. 176. How was the concrete placed by hand in the key?

A. Shoveled in.

X Q. 177. Shoveled in, and then rammed?

A. Tamped, what we call tamping.

X Q. 178. And it is your testimony that you used this machine No. 5 of Exhibit I to place the key in that arch?

A. We did.

X Q. 179. Well now, how much of that key did you place with that machine?

A. I am not positive on that point, 100 feet possibly or more.

X Q. 180. 100 feet or more?

A. Yes.

X Q. 181. And there were about 60 miles of those tunnels in the streets of Chicago?

A. I think there are about 100.

X Q. 182. They were building the tunnel lining then at a pretty rapid rate, were they not?

A. Yes, sir.

[fol. 178] X Q. 183. In 1903 and thereabouts?

A. Yes, sir.

X Q. 184. Now, was that 100 feet of key that you placed with this machine all in one piece or strips or different places?

A. All one strip, I believe. I was not there all the time they were using it, you understand. I had other duties to perform. I got up the idea of the machine or with Mr. Jackson's collaboration, and when the machine would get started, I was through, and I had other things to go after.

X Q. 185. Was it placed all at one time or at different times?

A. I believe all at one time. I do not want to be positive on that? I know they used it for over a week, and at that time they were driving about 15 feet in a day in a heading, and it was in one heading only.

X Q. 186. Do you remember about where that was?

A. On LaSalle Street north of Madison.

X Q. 187. North of Madison and between what streets?

A. I do not want to be sure of that. We would go in there and I do not know just what streets we were under or how far we were in. These details I did not bother with.

X Q. 188. Might it have been three or four blocks north of Madison?

A. I do not think it was that far. I would not say how far. I walked in that tunnel there myself and did not know where I was at times. There were no markings in the tunnel.

X Q. 189. Have you ever personally done any concrete tunnel lining?

A. Yes, sir.

X Q. 190. With a pneumatic machine?

A. No, sir.

X Q. 191. Never used a pneumatic machine for tunnel lining?

A. I never did, no, sir.

[fol. 179] X Q. 192. Do you know how extensively these pneumatic concrete placing machines are used today for tunnel lining?

A. At the present time I do not know. I know they have not been used on a great many tunnels.

X Q. 193. And I believe it is your testimony that after using this machine, illustrated by figure 5 of Exhibit I, on this one strip or piece of key you discontinued using it?

A. I do not know. No, they used it for grouting right along. I would be positive almost of that that they used it for grouting whenever they would have a leak for quite a while afterwards, but I did not go into that part of it.

X Q. 194. They did not use it any more for placing concrete?

A. No. After 177 Monroe Street? That was after the tunnel was placed.

X Q. 195. Yes.

A. If they did, I do not know; they may have.

X Q. 196. How soon after this tunnel was the work at 177 East Monroe Street?

A. Four or five months, I believe.

X Q. 197. How did they get the machine into 177 East Monroe Street from the tunnel?

A. I do not know. I did not bring it up.

Mr. Jackson had the foundation to bring it up there, and I do not know how he brought it. I presume he brought it up out of the shaft and transported it over there.

X Q. 198. Were you at 177 East Monroe Street when this machine was placed there?

A. I was there when they set it up and started it.

X Q. 199. What was the condition of the basement there?

A. The basement was practically clear at that time.

[fol. 180] X Q. 200. Was the shaft finished?

A. No, the shaft was not finished.

X Q. 201. How far along had they gotten with that?

A. That I do not know. I would not say just when that shaft was finished or when it was not. These details were not in my line of business.

X Q. 202. You were not connected with the tunnel?

A. I was not connected with the tunnel company, excepting as advisory engineer to Mr. Jackson on methods that he wanted to use. He asked my opinion on almost all mechanical devices that he used. I do not mean to say that he used all the things I suggested, or stopped using some of the things I suggested that he not use.

X Q. 203. That tunnel work, by the way, the tunneling of the streets of Chicago continued until 1909, did it not?

A. I understand later than that even. They did some work themselves. Mr. Jackson, I believe, continued until about 1909.

X Q. 204. Do you know how long Mr. Jackson continued there as engineer?

A. I am not positive on that score. I can give you my opinion of it.

X Q. 205. Yes.

A. I think in 1906 that Mr. Jackson made different arrangements. I think his contract was up, and he made different arrangements with the Tunnel Company. I think he went down afterwards on a percentage basis, but that I do not know. I was not a partner of Jackson at that time. I was simply an employee.

X Q. 206. At any rate, he continued his work on the tunnel until about 1909, according to your recollection?

[fol. 181] A. Up to that time sometime, yes, sir.

A. Up to that time sometime, yes, sir.

X Q. 207. Now, do you remember how that machine that you have described as being used at 177 East Monroe Street was mounted?

A. Mounted on a wooden frame.

X Q. 208. About how high was the frame?

A. Well, I do not know the height of the frame. The top of the machine I should judge would be about six feet.

X Q. 209. About how big was the machine?

A. The tank was rolled 20 by 30.

X Q. 210. Twenty by thirty?

A. Inches. I am talking about the sheet.

X Q. 211. Now, you are talking about the machine, figure 5 in Exhibit I?

A. Yes.

X Q. 212. By the way, did Mr. Jackson to your knowledge use any other grouting machines there than the ones you have testified to?

A. Afterwards I think he had another machine. In fact, I know he had one other.

X Q. 213. Where did he get that?

A. He bought it. It was not a pneumatic machine.

X Q. 214. I mean pneumatic machine.

A. No, not to my knowledge.

X Q. 215. He did not have any other pneumatic machines than the one you mentioned, to your knowledge?

A. Not that I know of.

X Q. 216. Now, I would like to have you make us a sketch showing how that machine was used to place the key of the arch. I will give you a piece of paper. Just draw a lengthwise section of the tunnel and show us the key and how the thing was done.

A. I think I can show that better by a cross section.

[fol. 182] X Q. 217. All right. Please show it both ways.

A. (Witness does as requested.) That will give you roughly about the way that was done.

X Q. 218. All right, now I want you to make——

A. This would show you where we placed the pipe. The machine would be here (indicating) and the pipe would come up there (indicating). It was on a track.

X Q. 219. Now, I will ask you to indicate the tunnel wall in the roof by "A".

A. (Witness does as requested.) At the roof?

X Q. 220. Yes, at the roof, put the "A" at the roof and also on the lengthwise or longitudinal view up above there.

A. That would be shaded. That comes on a curve and will be shaded down.

X Q. 221. Now, please indicate the forms running up to the key by "B" in both views.

A. (Witness does as requested.)

X Q. 222. Now, please indicate the pipe leading to the key for supplying the material from the machine by "C" in both views.

A. (Witness does as requested.)

X Q. 223. And the machine, please make that "D."

A. (Witness does as requested.)

X Q. 224. Now, the el running out to the machine; I mean the air pipe running through the lock to the machine?

A. The compressor air pipe that came along down on the floor?

X Q. 225. Just indicate it on both views, please.

A. Coming to the heading this way it was not inside the extension. We had to put an extension on the heading. That is where the heading was not concreted.

X Q. 226. Just show how that pipe ran to the machine?

A. From the air lock. This direction is the air lock and [fol. 183] the pipe ran through the heading. I have this reversed. This machine should show in here (indicating).

X Q. 227. Can not you show it?

A. The final position of the machine would be back there (indicating).

X Q. 228. Then your drawing is incorrect?

A. What we did instead of extending the pipe, when we would concrete a little we would run the machine back a little. The machine was mounted on a car.

X Q. 229. I want you to indicate how you connected that compressor air pipe that ran through the air lock to the machine.

A. I think it was connected to the machine. That was connected to the machine with a flexible joint down here, and run to the tank or to the pipe from the tank. I will show that right now, running from this side of the tunnel on the bottom, it ran across to the tank to the lining, and hooked onto that lining with a *t*.

X Q. 230. Just please letter that now "E" on both views.

A. (Witness does as requested.) It is pretty hard to show it. You are looking right at it. There will be a ring there and an "E". You are looking at the end of the pipe on the side when you turn over to your tank.

I do not know whether you can make that out or not. I can make you a sketch of that so you will have it tomorrow in pretty good shape, so you will understand it. I am not a very good free hand drawer.

X Q. 231. In this upper figure the pipe from the el out to the machine is running to the left, is that right?

[fol. 184] A. As you walk to the heading it was on the left hand side.

X Q. 232. No, I mean it would be this pipe running to the left or from the left in the upper figure of your sketch?

A. That was along the longitudinal side of the tunnel.

X Q. 233. Just please put an "E" on the end of that pipe nearest the air lock.

A. (Witness does as requested.)

Mr. Cox: All right. I offer that sketch in evidence.

(Marked Plaintiff's Exhibit No. 11.)

X Q. 234. Do you know how long this machine that you testified about was used at 177 East Monroe Street?

A. When they started it we had had an accident on the Eighteenth Street Bridge, and I was called away and went down there. I came back in about five days and everything was completed, the floor was completed. How long they used it, I do not know.

X Q. 235. Did you see it used for anything except placing a part of the floor there?

A. And underpinning.

X Q. 236. And some underpinning?

A. Yes, sir.

X Q. 237. That was about how long?

A. Well, the whole length of the wall. They wanted the foundation a little deeper; they had an old foundation, what they call a flooring foundation, and Mr. Jackson intended to put some machines in there, and wanted to get down to solid ground, so he had to underpin the wall to below the basement.

X. Q. 238. And the concrete flooring, was that the whole [fol. 185] floor or just a section of the floor?

A. The whole floor. He put in an entire concrete floor in the basement.

X Q. 239. How much of the floor was done when you saw it?

A. They just started it.

X Q. 240. Can you tell us what part of the year 1903 this was?

A. It must have been the first part of it; I am not positive.

X Q. 241. You say it was the first part?

A. That is my recollection. The reason I say that is I went with Mr. Jackson and did certain work for him previous to 1901. Jackson had another job, but I went with him in 1901, and he got me to sell out my interest and go with him in 1901. That is about the time we were doing the Eighteenth Street Bridge, which was about the beginning of 1903. We started to wreck the Eighteenth Street Bridge. We had fabricated it previous to that time.

X Q. 242. You say you remember it was in the early part of 1903 because you had an accident about that time?

A. Yes.

X Q. 243. You connect that accident with it?

A. I do, yes; that is what brings it to my mind.

X Q. 244. Was that a serious accident?

A. A derrick fell down, that was all.

X Q. 245. Hurt anybody?

A. A man claimed to be hurt, but we finally found he was not.

X Q. 246. As I understand it, from that time in 1903 until later which you say was 1906, when you saw it at the disposal plant, you did not see this machine?

A. I had seen the machine in the tunnel after that, yes, but I did not see it used.

X Q. 247. Where was it in the tunnel when you saw it? [fol. 186] A. It was, I think, down near the Van Buren Street incline.

X Q. 248. In part of the tunnel?

A. They had some trouble there with leaks, going under the river on Van Buren Street that went down about 65 feet.

X Q. 249. When was that?

A. In the year 1905.

X Q. 250. And that time was the machine hooked up?

A. No.

X Q. 251. To be operated?

A. No, it was not. They took it up there, and they were getting it ready. They had some serious leaks of air there, and they were getting ready to try to plug them up.

X Q. 252. Was this machine mounted permanently on a track?

A. It was mounted on a little car, and it could be taken off and set on, bolted to the frame of the car.

X Q. 253. But in the basement at 177 East Monroe Street I understand that it was mounted on a frame.

A. They took the frame right off the car, and brought it up and set it on some timbers.

X Q. 254. At the time that you saw Mr. Jackson use the machine at 177 East Monroe Street, did he have his headquarters there in the basement?

A. On 177, not yet, but he was going to go there. They were remodeling the building to get ready to go to 177 and the building had not been occupied. They just leased it, when this work was done.

Redirect examination.

By Mr. Johnson:

R D Q. 255. You testified in your cross examination that so far as you knew this machine, figure 5, Exhibit I, was [fol. 187] only used in the tunnel for about 100 feet or so placing the key. Why was it not used for any greater distance?

A. Mr. Jackson decided that he could put it in by hand just as well and cheaper than bother with the machine.

R. D. Q. 256. So that that is the reason that it was not used beyond the 100 feet or so?

A. That is the reason, yes, sir.

R. D. Q. 257. This drawing that you have made is not very clear to me, Mr. Fanning. Do I understand that there was a form up here by the key arch or not?

A. No form. We placed the lagging. You see the ribs are set up, and, as I said, as we built up the concrete the lagging plates were placed.

R. D. Q. 258. What are lagging plates? Is it a form?

A. It is a form, yes.

R. D. Q. 259. That is what I want to know.

A. It is a piece of a form.

R. D. Q. 260. The key arch would have a form?

A. Yes, sir; certainly.

R. D. Q. 261. Will you indicate that on this sketch?

A. Well, I showed it there with the form out, but this shows the ribbing.

R. D. Q. 262. Put the form in them.

A. Before we would close that we would put the form in there.

R. D. Q. 263. I want the form.

A. But those plates were placed as we concreted.

R. D. Q. 264. Put the form there, please, and give it a number or letter.

A. F.

R. D. Q. 265. You have now indicated the key arch as having a form, the form being "F," is that right?

A. Yes, sir.

[fol. 188] R. D. Q. 266. It was brought out in your cross examination that after starting to use this machine No. 5, Exhibit I, for laying the concrete floor at 177 East Monroe Street—

A. That was the old number.

R. D. Q. 267. You saw a portion of the floor laid by this machine, and then you were called away on account of an accident?

A. Yes, sir.

R. D. Q. 268. Is that right?

A. Yes.

R. D. Q. 269. You were away five days or so?

A. Five days before I went back there.

R. D. Q. 270. When you went back the floor was completed, was it not?

A. The floor was completed, and the machine disconnected.

(It was stipulated that the rebuttal evidence be taken at this time.)

REBUTTAL PROOFS

WILLIAM H. LARKIN, JR., called as a witness on behalf of the plaintiff, in rebuttal, having been duly sworn, testified as follows:

Direct examination.

By Mr. Cox:

Q. 1. Mr. Larkin, will you please state your name, age, residence, and occupation?

A. William H. Larkin, Jr., age 56, occupation mechanical [fol. 189] engineer United States Rubber Company; residence 285 Central Avenue, New Haven, Connecticut.

Q. 2. Have you ever been interested in concrete and the placing of concrete pneumatically?

A. Yes, sir, for twenty-five years.

Q. 3. Have you during that time kept records of the development of that branch of the industry?

A. Yes, sir, carefully.

Q. 4. I will ask you to state whether to your knowledge anything was published relating to the work of John H. McMichael prior to,—well, we will say 1915?

A. Yes, sir.

Q. 5. When was the first thing that came to your attention?

A. About 1907 with regard to his work in Toledo.

Q. 6. And what was that?

A. He did some work for the Steel Company in Toledo, placing concrete pneumatically through pipes.

Q. 7. Now, did you see any article published in a magazine or engineering publication relating to this work?

A. Yes, sir, I have a copy of the article which I cut out personally about 1907 relating to Toledo, and also of the Harvard Denison Viaduct of Cleveland.

Q. 8. And when was that article published?

A. As near as I can recollect in 1907. The date is on the article there in that scrap book of mine.

Q. 9. Now, I will ask you to fix the date by referring to this book which you say is your scrap book.

A. The article in regard to McMichael's Toledo work I cut out of "Concrete Engineering," in December, 1909.

Q. 10. And you say your recollection is that something relating to that was published in 1907?

[fol. 190] Mr. Johnson: The witness has stated that that it was 1909. I object to the question that has just been asked. He is attempting to put dates in the mind of the witness when he has already testified it was 1909.

The Court: Objection sustained.

Mr. Cox: I only did that when the witness mentioned the publication in 1907.

Q. 11. Now, this publication in 1909 that you have identified, do you understand the apparatus illustrated and described and did you understand it at the time?

A. Yes, sir.

Q. 12. Just please describe it briefly.

Mr. Morgan: I object to that question, your Honor. The article speaks for itself.

Mr. Cox: I will tell you of this. The witness Artingstall said he showed McMichael how to make his machine work by putting a piece in the bottom in 1911.

Mr. Morgan: Your Honor, we will withdraw our objection to the question if the witness will state that that is his opinion. If he is going to testify absolutely as to the structure, and the structure is illustrated and described and explains itself, and if the disclosures there are incomplete and this man as an expert wishes to express an opinion on these points, we will not object to its being put in.

Mr. Cox: That is all.

The Court: All right, go on.

[fol. 191] A. The machine consists of a tank with a conical shaped lower end. On top of the tank there is a hopper which communicates to the tank body itself. On the lower end of the tank attached to the conical part is a discharge pipe which receives the concrete. Compressed air is ad-

mitted to the top portion of the tank by a small pipe from which also leads a connection to the bottom portion of the apparatus directly into the discharge pipe. What we knew in those days as a booster.

Mr. Cox: Now, I will offer in evidence a photographic copy of that article, and submit to plaintiff's counsel the original article in the witness' diary.

Mr. Johnson: I object to that, your Honor. This article does not prove itself. Apparently they are relying upon this article, and if they are relying upon this article simply to refresh the recollection of the witness, that is one thing; but if they are relying upon it as a publication, why, that is another thing.

The Court: What do you wish them to prove, the publication?

Mr. Johnson: They should certainly have some proper way of proving that that is the publication.

Mr. Morgan: It is nothing but a cut out of a scrap book.

Mr. Cox: This witness says he cut it out.

[fol. 192] The Court: Where is the original that it was cut out of?

Mr. Cox: Right here.

Mr. Morgan: I know, but it does not establish that it was published on that date.

Mr. Cox: It has the date on it, and he says it was cut out at that time.

The Court: I will allow it. You do not want him to go to work and prove that that was actually published in that book, and so forth?

Mr. Johnson: Looking at the book here, it looks all right.

The Court: You do not suppose that he made up a magazine?

Mr. Johnson: I hope not.

Mr. Cox: I will ask the witness.

By Mr. Cox:

Q. 12. Can you state whether the magazine "Concrete Engineering" was published in December, 1909?

A. I can.

Q. 13. And you cut it out about that time?

A. Yes, sir.

The Court: All right.

(Marked Plaintiff's Exhibit No. 12.)

Q. 14. Now, at or about that time you also obtained a paper folder describing McMichael's work on the Denison Viaduct in Cleveland?

A. Yes, sir, the full name was Harvard-Denison Viaduct.

Q. 15. How did you receive that?

[fol. 193] A. This was sent to me through the mail by an associate of mine in the concrete engineering business.

Q. 16. When did you receive it?

A. I know that by the post mark on it which states "January 31, 1910."

Q. 17. Did you visit the Denison Viaduct while that work was going on?

A. No, sir, afterwards.

Q. 18. How soon afterwards?

A. Why, about, well, very shortly after it was finished, while some of the contractor's machinery was still on the job.

Mr. Cox: Now, I would like to offer this article and this illustration and description of the work on the Denison Viaduct in 1909 which the witness has testified to.

Mr. Johnson: Did you get this in 1910 or 1911?

The Witness: January, 1910.

Mr. Johnson: I see no objection to it except it is immaterial.

The Court: Overruled.

Mr. Cox: I will remove this article from the witness' diary and offer it in evidence.

(Marked Plaintiff's Exhibit No. 13.)

Cross-examination.

By Mr. Johnson:

X Q. 19. As I understood you, Mr. Larkin, this Plaintiff's Exhibit 13 you received on or about January 31, 1910?

A. Yes, sir.

X Q. 20. I will ask you to point out on the three cuts on this exhibit where the air is shown admitted to the concrete blower, if it is a concrete blower.

[fol. 194] A. This evidently is air pipe here, and the connection to the top of the tank is about here (indicating).

X Q. 21. Better letter it as you go along, if you will.

A. I should call the air pipe leading air to the machine "A" entering the machine at the point "B." I assume, if I may, that the connection to the lower end of it is concealed by the body itself. This picture is not very distinct.

X Q. 22. Then, as I understand you, Mr. Larkin, no one of these cuts of Exhibit 13 show any air connection with the alleged pneumatic blower except in the top which you have designated "B," is that right?

A. Right.

The Court: Do you mean in the top of the hopper?

Mr. Johnson: Yes, sir.

By Mr. Johnson:

X Q. 23. That is, there is only one air connection shown, if shown at all, in this Exhibit 13?

A. Due to the position of the photographer.

X Q. 24. I do not understand you, sir.

A. The pipe to the lower connection is necessarily behind the machine and the machine is between us and the back connection.

X Q. 25. I will ask you to take this same cut and put a letter on the lower air connection if you can find it.

A. The machine itself is exactly between us and the lower air connection as the photograph was taken.

X Q. 26. That may be true, Mr. Larkin, but I am talking now about the exhibit itself and not asking you to draw [fol. 195] on your imagination. I am asking you to kindly point out on this exhibit by a suitable reference letter the second air connection if you find it on that cut.

A. It is not shown.

X Q. 27. I hand you Plaintiff's Exhibit No. 12 and ask you to point out in the two cuts, A and B, how the air was admitted to the cylinder of this pneumatic blower, if that is a pneumatic blower?

A. There is a rubber hose connected with the air receiver. A. The rubber hose marked B connects to the top of the machine at the point C. A branch leads down from the point C by means of the pipe D to the lower end of the

apparatus at the point E. This (referring to the second cut, B) is simply the discharge end. It simply shows that the discharge end of the apparatus may be 100 yards away from the machine.

X Q. 28. Now I ask you if either cut of this exhibit 12 shows any air connection other than that which you have just described?

A. I think I understand ou. There are two air connections. One is at the point C at the top of the machine and one at the point E at the bottom of the machine.

X Q. 29. Do you mean to say, sir, that the air connection E, this indistinct line adjacent apparently to a pipe, is a second air connection?

A. Yes, sir.

X Q. 30. If that were an air connection it would let air in at right angles to the discharge pipe which I will ask you to mark "F," would it not?

A. It would be parallel in the same plane with the beginning of the discharge pipe and at an angle with a later por- [fol. 196] tion of the discharge pipe. The discharge pipe takes a turn slightly away from the machine.

X Q. 31. Where is the description of this connection E that you state is the second air connection? Is it in that article?

A. No.

X Q. 32. Then you are just drawing on your imagination when you say that E is a second air connection, are you not?

A. No.

X Q. 33. Why not, sir?

A. Because I was the first patentee on that style of apparatus and I followed McMichael's work from the start. I knew exactly what his machine was.

X Q. 34. That is, you knew what his patent was? Do you mean?

A. Both the patent and the published descriptions of his machines. I have a great many of them.

X Q. 35. That is, when this thing was published, say in December, 1909, you knew McMichael's commercial form of machine and also his patent?

A. Yes, sir.

X Q. 36. The patent in this suit?

A. Yes.

X Q. 37. Had you actually seen the machine of Exhibit No. 12 at this time?

A. No.

X Q. 38. When did you first see a machine like Exhibit No. 12 in operation?

A. I never saw it.

X Q. 39. Then, if I understand you correctly, there is no description in this Exhibit No. 12 about any second air connection which you happened to have lettered "E," and you have never seen the machine in operation?

A. No.

Redirect examination.

By Mr. Cox:

R. D. Q. 40. Mr. Larkin, have you seen pneumatic concrete placing machines in operation other than McMichael's?

[fol. 197] Mr. Johnson: I object to that, your Honor, on the ground that it is irrelevant.

The Court: I will allow the question. It can not do any harm.

A. Yes, sir, machines of my own design.

R. D. Q. 41. Have you operated them yourself?

A. Yes, sir.

Mr. Cox: I want to offer in evidence a certified copy of the drawings in the application of John H. McMichael for a patent filed September 6th, 1910. The patent is No. 1,185,117.

Mr. Johnson: I see no objection to it, your Honor.

(Marked Plaintiff's Exhibit No. 14.)

John Ericson, called as a witness on behalf of the plaintiff, in rebuttal, being duly sworn, testified as follows:

Direct examination.

By Mr. Cox:

Q. 1. Mr. Ericson, where do you reside?

A. Chicago, Illinois.

Q. 2. What is your occupation?

A. I am City Engineer of the City of Chicago.

Q. 3. As City Engineer of the City of Chicago how many engineers have you under you?

A. Taking all classes of engineers I must have more than a hundred, anyway; perhaps more.

[fol. 198] Q. 4. Is Mr. William Artingstall one of them?

A. Mr. Artingstall at the present time is detached from the Engineers Department for the last two or three years.

Q. 5. Has he an office in your Bureau?

A. Yes, sir.

Q. 6. Is he employed by the City?

A. Yes, sir.

Q. 7. At what salary?

A. $5,000 a year.

Q. 8. What did Mr. Artingstall have to do with the erection of the $5,000,000 Municipal Pier in Chicago?

A. I was Chairman of the Harbor & Subway Commission that was appointed in 1911 to prepare plans for a subway and also to have charge of the assignment and layout of Municipal piers, and during that time Mr. Artingstall was one of the employees of the Commission.

In 1914 I left the Commission and went back to my regular duties as City Engineer. I continued as City Engineer even during that time, but I had an assistant, a Deputy, that carried on most of the work in the City Engineer's office at that time.

While I was there, in the three years I was there, Mr. Artingstall was employed almost exclusively on the subway work, the detail work on the subways. After I left, the general plans had been made and detailed plans to some extent were made afterwards, and I do not know whether Mr. Artingstall had anything to do with the Municipal Pier after that or not.

There was a man by the name of Shanklin that had charge of the work.

Q. 9. What had you to do with the construction of the Illinois tunnels under the streets of the City of Chicago?

[fol. 199] A. The work of supervising the work for the City, to see that the ordinances were complied with and so forth, was turned over to me in 1900. I am sure it was in

1900. Since that time I had complete charge for the City as supervising engineer over that construction. There was assigned to the City Engineer other duties.

Q. 10. What is the extent of those tunnels?

A. They must be about this time about sixty miles, I believe.

Q. 11. Were you familiar in a general way with the work that went on in those tunnels between 1900 and 1907?

A. Yes, sir.

Q. 12. To whom were all the plans for work in that tunnel submitted?

A. They were submitted to me for the issuing of permits.

Q. 13. And by whom were they submitted?

A. All the plans I saw ever since I had charge of that work were signed by Alfred Slade, Engineer of the Tunnel Company.

Q. 14. By the way, you are an engineer, Mr. Erieson, are you?

A. Yes, sir.

Q. 15. Where were you educated?

A. I was graduated in 1880 from the Royal Polytechnic Institute of Stockholm, Sweden, and I have been in the City Service as civil engineer and City Enginer 42½ years, and I have been City Enginer 30 years next spring.

I might mention that as City Engineer, the City Engineer has charge principally of the construction, operation and maintenance of all the waterworks system, of all bridges, and such other work as the Commission or the Council as- [fol. 200] signs to the City Engineer, like this pier work, and so forth.

Q. 16. Did you have inspectors under you to inspect that tunnel as the work progressed?

A. Yes, sir.

Q. 17. Did you visit the tunnel personally between 1900 and 1907 at frequent intervals?

A. Yes, sir; not very frequently, but I went down there from time to time.

Q. 18. About how often?

A. Well, it may have been once a month, sometimes a longer period between.

Q. 19. Who was your chief inspector during that period?

A. Mr. Lynch was chief inspector——

Q. 20. His full name?

A. John Lynch, practically ever since the work was started, but I had an engineer representing me on the work up until 1904, and after 1904 I had one or two inspectors; I had one I remember distinctly because he stayed a long, long time, but I think I had a second one, I can not remember his name.

Q. 21. Were you familiar with the construction of those tunnels and the lining of them?

A. Yes, sir.

Q. 22. And with the work that went on there?

A. Yes, sir.

Q. 23. How were the walls of the tunnel lined?

A. The walls were lined with concrete. The tunnel itself, all I saw of it, I mean the material through which the tunnel was constructed, consisted of quite plastic clay, and it is therefore necessary to keep air pressure on; about ten or twelve pounds are generally kept on there to hold the ex- [fol. 201] cavation in position while the lining is being put in.

The first thing to be done was to build a concrete bottom and then put up laggings, we call it, forms of steel, and back of those forms were placed laggings. I think in the very beginning they used wooden laggings, but for practically all of the work afterwards they used steel plates for laggings which were stuck in starting at the bottom and built up and then the concrete was shovelled in back of that lagging as they went up. Then, when they came to the top there was a space where they could not put it in sideways, of course, because they had to have something to support it. So they had plates then that conformed exactly to the very top of the tunnel, about three feet long. Then they put in the concrete from the front until that was filled, and then they put in another plate until they got the length of the section done that way.

Q. 24. What air pressure was used in the construction of that tunnel?

A. Really, I never saw it over ten pounds, but I understand they used about twelve pounds at times; around about ten pounds, it might be a trifle over.

Q. 25. Was there any high pressure air machinery used in there?

A. I never saw it.

Q. 26. Were there any pipes for high pressure air machinery?

A. I never saw that.

Q. 27. Or for supplying higher pressure of air than the ten or twelve pounds?

A. No, sir.

Q. 28. When did you first see a pneumatic concrete placing machine used?

A. The first I saw was a big water tunnel they built, an eight-mile tunnel partly under the lake and partly on land [fol. 202] at Wilson Avenue, Chicago. It was a twelve-foot tunnel. There they used concrete placing machines all through.

Q. 29. Who was the man who had charge of the machines for lining the tunnel?

A. You mean for the City?

Q. 30. No, for the contractor?

A. The company's name, I think, was the Concrete Conveyor and Placing Company, but we had practically all our dealings with a gentleman by the name of Kirkland.

Q. 31. H. B. Kirkland?

A. Yes.

Cross-examination.

By Mr. Johnson:

X Q. 32. Mr. Ericson, I understand, sir, that you have a great many duties in your position?

A. Yes, a great many. I have got twelve big divisions in my Bureau. Each division is a pretty big thing.

X Q. 33. And when you got down to these tunnels, you say that it might be an interval of a month or longer between the times that you went down to inspect it?

A. It might have been, but I had reports from my inspectors every day; had a daily report from the inspectors.

X Q. 34. You have stated that when you went down there you never noticed in any of these tunnels any pipe for air which would be over the 12 pound pressure?

A. I saw no extra pipes, and I could see plainly the pipe that they used for filling the tunnel, that there was no other pipe.

[fol. 203] X Q. 35. You never noticed any other?

A. There were none, I am pretty sure. I remember those air locks pretty well. I built a good many air locks myself, so I am familiar with the construction of them.

X Q. 36. If it was more than a month or longer between your visits, it is possible that an air line might have been put in and taken out between your visits, is it not?

A. They would have to cut holes through the air lock—you mean extending it into the tunnel?

X Q. 37. No, getting it into the lock.

A. Of course, they could do that in a month and take it out again and make it appear as if nothing had been done at all. I presume that is possible. I do not think it is very probable.

X Q. 38. How did they excavate in the lock? Did they have drills?

A. No, that clay is very plastic. Mostly I saw them they used knives and cut it like cheese.

X Q. 39. All by hand?

A. By hand.

X Q. 40. No instruments at all?

A. I never saw anything like that in that tunnel. I guess later on—I remember they had a little harder stuff where they used a kind of pneumatic shovel in later years, but never any drilling or anything of that kind.

X Q. 41. You have no recollection of ever seeing such a thing?

A. I can not conceive of their using it in that material. I am pretty familiar with the material in Chicago in the last 43 years that I have been making constructions there all over.

X Q. 42. Are all the tunnels run through a stratum such [fol. 204] as you have described?

A. No, sir. We built our early water tunnels generally in a hard clay, much lower down of course than these tunnels, but of late years we built practically all our water tunnels through solid rock. We go down perhaps 150 to 200 feet in solid rock and built our tunnels in solid rock now. We built one tunnel many years ago, a land tunnel, that we had material somewhat similar to this, although a little bit harder than it was up there.

X Q. 43. Did you ever have to go through hard pan?

A. Yes.

X Q. 44. Would that simply be a matter of digging without the aid of tools?

A. No, sir; when we got into hard pan, it is pretty hard work. Sometimes we placed a drill there.

X Q. 45. You would have drills in such a stratum as that?

A. In hard pan, yes, sir.

X Q. 46. Mr. Ericson, will you tell me how you got the electric light wires into the heading?

A. I think they put it in considerably later. I could not tell you exactly how that was done. I have not any recollection of it. That would be a very small pipe anyway.

X Q. 47. But it would be a pipe through the shield, would it not?

A. Very likely they would have to have that, yes.

X Q. 48. And you have no recollection—

A. I have no recollection of that.

X Q. 49. They worked there with electric lights, did they not?

A. Yes.

X Q. 50. And they had to get the electric lights into that shield some way, did they not?

A. Yes.

[fol. 205] X Q. 51. And it had to go through the lock?

A. Yes, but we would not notice such a little pipe. If there was a large pipe I would certainly notice it; I would hear of it.

X Q. 52. What do you mean by a large pipe?

A. You mean to bring the compressed air in?

X Q. 53. I am asking you what you mean by a large pipe. You say you would not have noticed a pipe big enough to carry several electric light wires into the heading. What is a small pipe that would carry some of those wires that have to go in there, with relation to a small pipe that would carry compressed air, for example?

A. You have to have—it depends on how much compressed air you want to place in there. What would the high pressure compressed air be used for? If you tell me that, I can answer the question a little better. What purpose would it be used for? For drilling purposes?

X Q. 54. For any purpose that it was necessary to use it for. If you happen to hit a boulder or hard pan, or anything. I do not know, of course.

A. Of course, I will not say this positively. I do not think they ever used any blasting in there. On boulders, I think they simply dug a grave for them and buried them and carried right on.

X Q. 55. But they might have blasted them, might they not, between the times of your visits?

A. I think I would have known about it and heard of it. I never heard any blasting in the tunnel under air pressure. That was about ten pounds air pressure. I never heard that they did that in that tunnel.

[fol. 206] X Q. 56. But you do know that they got the electric lights into the heading and they went through a pipe through that shield?

A. I can not tell you about that pipe. I did not see it at the time.

X Q. 57. But you know they had electric lights there?

A. Yes.

X Q. 58. And they had to get through the shield for the pipe, did they not?

A. I assume so. I do not assume they put it in in any other way. They did not put it in from the top.

X Q. 59. Mr. Ericson, in that heading and the longer tunnel, they had to have hangers for the electric light wires, did they not?

A. I do not remember whether they used hangers or small brackets on the sides. I do not remember that. I did not pay so much attention to that as to the construction work itself.

X Q. 60. But how did they make the holes for the fastenings for these hangers or brackets, and so forth?

A. They do not take much of a hole, for that. You can drill a little hole in concrete. You do not have to have any special machinery for driving a little hole for hanging a wire.

X Q. 61. I am talking about getting through the shield into the heading.

A. That is what I am talking about.

X Q. 62. And there were hangers that had to be supported on the wall?

A. Either hangers or some little brackets on the side of the tunnel, I do not remember. That is a very small matter.

X Q. 63. You do not remember how they were supported?

A. No, I do not remember how those lights were supported.

[fol. 207] X Q. 64. Mr. Ericson, you are not the Director of Public Works of the City of Chicago, are you?

A. With the Director.

X Q. 65. You are not the Director?

A. No; I am the City Engineer.

X Q. 66. Mr. Artingstall, who has previously testified in this case, is not in your department, is he?

A. Not since three years ago. He occupies a small room in my department, that is all, and he reports now directly to the Commissioner of Public Works on the work he has in hand.

X Q. 67. He is not under your jurisdiction?

A. Not now, no, sir.

X Q. 68. Are not all the Municipal piers and harbor work under the Harbor Master of the City of Chicago?

A. Not the construction—the Harbor Master has simply charge of the operation of vessels, and he gives permits for the rebuilding of docks and so on, but in any big construction, the Harbor Master, at least never before, had anything to do with construction. For instance, this Municipal Pier, the Harbor Master had nothing whatever to do with.

X Q. 69. That was only assigned to the Harbor Master about two or three years ago?

A. The Harbor Master was assigned as a superintendent over the finished pier sometime ago; but, as I say, they are building a kind of breakwater now that I think the Engineer of the Harbor Master has supervision over. But that is the first I ever heard of the Harbor Master ever having anything to do with the construction of piers, except, as I say, issuing permits for replacing and repairing docks.

[fol. 208] X Q. 70. Did you ever read the Ordinance of the City of Chicago establishing the duty of the Harbor Master?

A. Yes, I read that.

X Q. 71. Are you familiar with that?

A. I have not read it for a long time, but that can be verified.

X Q. 72. How long since you have read the City Ordinance relating to that thing?

A. I do not remember; I think quite a long time.

X Q. 73. Several years?

A. Possibly.

X Q. 74. About how long would you say, roughly?

The Court: That is a waste of time. I do not care how long ago he read it.

A. The Harbor Master used to be a subordinate of the City Engineer until about 10 years ago.

X Q. 75. Mr. Ericson, was not Mr. E. C. Shanklin the Chairman of the Harbor & Subway Commission, the successor of the Harbor Commission?

A. I was Chairman for the first two years, I believe, and Mr. Shanklin succeeded me as Chairman. I think it was a short time before I returned to full duty as City Engineer. But I was Chairman when it was organized, and I was during the time the Harbor plans for the pier were made, I mean the preliminary plans. The detail plans were made afterwards while Mr. Shanklin was Chairman.

X Q. 76. And those detail plans were made by Mr. Artingstall who has previously testified, were they not?

A. I understand that a man by the name of Zaline was the Chief Draftsman under Mr. Shanklin's direction for all those plans.

[fol. 209] X Q. 77. Was he not a draftsman under Mr. Artingstall?

A. If he was, it is more than I know about it. I never heard of that. Zaline was there during the entire time I was Chairman, and he did not work under Mr. Artingstall at all. He took orders direct from the Board of Commissioners. If there was anything of that kind, it happened afterwards.

Redirect examination.

By Mr. Cox:

R. D. Q. 78. Just one point: How far below the surface are these Illinois tunnels that we have been talking about?

A. As they are built now, the bottom is about 30 feet below the surface.

R. D. Q. 79. What is the character of the stratum there?

A. As I said, every time I was in there and tested the material, it was generally quite plastic clay, blue clay.

(Adjourned to October 7th, 1926, at 10:30 A. M.)

Alfred Slade, called as a witness on behalf of the plaintiff, in rebuttal, being duly sworn, testifies as follows:

Direct examination.

By Mr. Cox:

Q. 1. Mr. Slade, where do you reside?

A. In Chicago, Illinois.

[fol. 210] Q. 2. What is your occupation?

A. Civil engineer.

Q. 3. What is your present work?

A. As chief engineer of the Chicago Tunnel Company.

Q. 4. How many miles of tunnel are comprised in that Chicago tunnel system?

A. About 60, between 60 and 61.

Q. 5. Between 60 and 61 miles?

A. Yes, sir.

Q. 6. Is it in operation?

A. Yes, sir.

Q. 7. For what is that tunnel used?

A. For merchandise, transporting merchandise.

Q. 8. From different terminals to various buildings throughout the city?

A. Yes, sir.

Q. 9. Mr. Slade, I am going to ask you your age?

A. Seventy-two.

Q. 10. And what is your physical condition?

A. It could not be better.

Q. 11. Are you occupied as chief engineer of the Chicago tunnel system daily?

A. Yes, sir.

Q. 12. What did you have to do with the construction of those tunnels?

A. I was in charge of all the engineering work, plans and inspection.

Q. 13. Who was the chief engineer from 1899 to 1906?

A. George W. Jackson was the chief engineer and general manager.

Q. 14. And you worked with Mr. Jackson on the construction of those tunnels?

A. Yes, sir.

Q. 15. Are the records of the construction of those tunnels still in existence?

A. Yes, sir.

Q. 16. By the way, what connection, if any, did Mr. Jackson have with the tunnels after 1906?

A. No connection.

Q. 17. I mean with the construction of them.

A. As contractor.

[fol. 211] Q. 18. He was the contractor on the construction of the tunnels after he quit as chief engineer in 1906?

A. Yes, sir.

Q. 19. Until what date?

A. About 1910, 1909 or 1910.

Q. 20. As engineer on the construction of these tunnels, what work did you do besides making the plans and so forth?

A. All the engineering work. I was making the plans and supervising the work, seeing that it was done in accordance with the plans, anything in connection with the engineering work.

Q. 21. How frequently, if at all, did that work take you into the tunnels to watch the operations that were going on there in connection with the construction of the tunnels?

A. At the start, two or three times a day, not less than twice a day the first year.

Q. 22. How long did that continue?

A. It continued from 1899 to 1901 or 1902; the first and second periods.

Q. 23. How long were you in the tunnels daily in connection with your duties?

A. It might take an hour or two.

Q. 24. During what period were you in the tunnel daily?

A. Generally in the morning.

Q. 25. I mean what years?

A. Up to 1904.

Q. 26. What part of 1904?

A. Towards the end when I got more help.

Q. 27. After that time in the latter part of 1904, how frequently did you have occasion to go into the tunnels?

A. About every other day, I guess, when ever necessary; every other day, I should say.

[fol. 212] Q. 28. When did you become chief engineer of the tunnels?

A. In 1910.

Q. 29. Between the time when Mr. Jackson changed his relations with the construction of the tunnels in 1910, who was chief engineer?

A. We had no chief engineer.

Q. 30. Did you perform the duties of chief engineer during that period?

A. Yes.

Q. 31. During the period from 1900 up to date, how many days have you missed from your work?

A. One; on account of sickness, one day.

Q. 32. Taking the period from 1900 to 1907, just tell us briefly how the tunnel was constructed, how the work was carried on.

A. In the first place, the air locks were installed, and then the work was done—you mean how it was constructed?

Q. 33. Yes.

A. The clay was mined out a distance of about 12 feet. That was about the limit, 12 feet in the heading. Then the concrete was brought in in small cars and the bottom was placed 12 feet.

Q. 34. What was the nature of the soil through which that tunnel was dug?

A. It was what we call medium blue clay.

Q. 35. Was there any rock or hardpan in that?

A. No, sir.

Q. 36. How was the work of excavating the tunnel and lining the tunnel done?

A. The excavating was done with what we call mining knives, a circular knife with two handles, and it was cut

out in slices. The bottom was excavated by spade or shovel.

Q. 37. By hand?

A. All by hand.

[fol. 213] Q. 38. You had some pretty powerful men working on that, did you not?

A. As high as four men on one knife.

Q. 39. And they were strong men?

A. Strong men.

Q. 40. Taking the period up to 1907, state whether any compressed air apparatus was used in the tunnel.

A. Compressed air was used up to about 12 pounds, from 10 to 12 pounds, inside of the air lock to hold back any swelling of the clay.

Q. 41. How was the compressed air of 10 or 12 pounds supplied to that air lock?

A. It was supplied from a low pressure air compressor in the basement of the buildings, and it was carried to the air lock, to the inside of the air lock.

Q. 42. Was there any other compressed air used in that tunnel?

A. Not that I know of.

Q. 43. If there had been, would you have known of it?

A. I certainly would.

Q. 44. Were there any pipes going into the air lock for compressed air?

A. No, sir.

Q. 45. During this period from 1900 to 1907, how was the concrete placed to line the walls of the tunnel?

A. Placed by hand, by shovel.

Q. 46. Any other method used?

A. No, sir.

Q. 47. At any time?

A. Not that I know of.

Q. 48. If it had been used, would you have known of it?

A. I certainly would.

Q. 49. Was there any machinery or apparatus in the heading of the tunnel or anywhere where the work of digging and lining the tunnel went on, for handling concrete or the like, pneumatically?

A. No.

[fol. 214] Q. 50. At any time?

A. Not at any time.

Q. 51. Can you state when the Tunnel Company took over the building at 177 East Monroe Street?

A. In 1904, January, I think, 1904.

Q. 52. How are you able to fix the date when the Tunnel Company took over the building at 177 East Monroe Street as 1904?

A. From an inspection made as to the condition of the building at that time.

Q. 53. Who made that inspection?

A. It was made by one of our engineers by the name of Knowles. I made the report. The report was made by me.

Q. 54. Did you have occasion to visit the building in connection with this inspection?

A. I checked it up.

Q. 55. Have you here a copy of the report made by you on that inspection, January 23, 1904 (handing paper to the witness)?

A. Yes, sir.

Mr. Cox: I offer this in evidence.

(Marked Plaintiffs' Exhibit No. 15.)

Q. 57. With this report there is a large blueprint. What does that show?

A. That was the basement, first floor and second floor of the building at 177 East Monroe.

Q. 58. And when was that made, if you are able to state?

A. January 25, 1904.

Q. 59. What was the condition of the basement floor when this report and this blueprint were made in 1904?

A. I think it was a wooden floor.

Q. 60. Was it concrete?

A. No.

Mr. Cox: I offer that blueprint in evidence.

(Marked Plaintiff's Exhibit No. 16.)

[fol. 215] Q. 61. Was the floor of that basement subsequently concreted?

A. It was.

Q. 62. By the Tunnel Company?

A. By the Tunnel Company.

Q. 63. Was any pneumatic machine used in connection with the concreting of that floor?

A. Not that I know of. I did not see any.

Q. 64. If it had been, would you have known of it?

A. I think so. I certainly would.

Q. 65. Was there any machine in that basement in 1904 for handling concrete or grout by compressed air?

A. I never saw one.

Q. 66. If there had been one there, would you have seen it?

A. I think so, yes, sir.

Q. 67. Prior to the time when the Tunnel Company took over this building in 1904, how was it occupied?

A. By different firms in different businesses. I do not remember what businesses were in there. It was not an office, it was not occupied as an office.

Q. 68. Did Mr. Jackson or anyone connected with the Tunnel Company have anything in there prior to 1904?

A. No, sir.

Q. 69. Can you state when that building, the basement of that building at 177 East Monroe Street, was connected with the tunnel in the street?

A. I think about July, 1904, July or August.

Q. 70. How was that connection made?

A. By a shaft connecting to a turn-out, as we call it; a turn-out from the main line on Monroe Street.

Q. 71. It was a turn-out from the main line of the tunnel on Monroe Street that went into the building?

A. Under the sidewalk.

[fol. 216] Q. 72. What connected that——

A. A vertical shaft from the basement to the turn-out.

Q. 73. What was in that shaft?

A. An elevator, a freight elevator.

Q. 74. Do you know when that elevator was installed?

A. In August, 1907.

Q. 75. In August of what year?

A. 1904, I mean.

Q. 76. Have you the record of the construction of that turn-out from the main tunnel to connect the basement of 177 East Monroe Street?

A. Yes, sir.

Q. 77. Is this it (handing paper to witness)?

A. Yes, sir.

Q. 78. Please give us the dates of the beginning and completion of the work of constructing that turn-out.

A. On the east end it was started on June 17, 1904, and on the west end, June 15, 1904, and completed; they met, on July 21, 1904.

Mr. Cox: I offer that in evidence.

(Marked Plaintiff's Exhibit No. 17.)

Q. 79. After 1904, was concrete mixing done in the basement of 177 East Monroe Street; I mean was concrete mixed there?

A. I do not recall. I do not think so.

Q. 80. I mean for the tunnel?

A. No, the tunnel was completed in that district in 1904.

Q. 81. By the way, this part of the tunnel that connected with 177 East Monroe Street was the section of the tunnel known as what shaft?

A. No. 1.

Q. 82. What other name did it have, if any?

A. Powers & O'Brien was the general name.

[fol. 217] Q. 83. Why was it called Powers & O'Brien?

A. Because it was under their saloon, Powers & O'Brien's saloon on Madison Street.

Q. 84. That is to say, the shaft No. 1 was put in there?

A. Shaft No. 1 was put in from that basement.

Q. 85. Just tell us briefly how the key of the tunnel lining was placed in all that work up to 1907, say.

A. The key was put in—as the walls were brought up, the key nearest the completed work was put on in three foot sections by shoveling and another three foot section, and the last three was left open because the forms were set up right against the clay. There was no way of getting the key in. You would have to get it in from the end and the end was up against the clay.

Q. 86. Have you here an illustration showing how the tunnel was excavated and lined (handing paper to the witness)?

A. That is taken from a photograph.

Q. 87. Was it all done in that manner?

A. It was all done in that manner.

Mr. Cox: I offer that in evidence.

(Marked Plaintiff's Exhibit No. 18.)

Q. 88. What are those lines in the earth?

A. That is from the circular knife. The clay was cut with a circular knife and it shows it there like a sausage.

Q. 89. And the key was put in last by shovels and rammed?

A. Shovels and rammed, except the last three feet which could not be reached on account of being up against the clay.

[fol. 218] Q. 90. How was that placed?

A. That was placed the following day.

Q. 91. This picture shows a portion of the key left?

A. Yes, sir.

Q. 92. Which will be filled in the following day when the heading advances far enough for the men to work?

A. That was the first day's work, and the second day's work ready to be concreted, and it shows that before they mined, they could not put in the last three feet of the key.

Q. 93. What kind of concrete was used in the lining of that tunnel?

A. An inch to an inch and a half stone or gravel, part crushed stone and part gravel, and the mixture was one part of Portland cement, three parts of sand, and five of crushed stone.

Q. 94. So it was five-ninths stone?

A. About an inch and a half crushed limestone or gravel.

Q. 95. How was the concrete taken into the tunnels for the lining?

A. In small cars about a half yard in capacity.

Q. 96. And how were they drawn?

A. Small mules.

Q. 97. Why did you use small mules?

A. A large one could not get through the air lock.

Q. 98. How large was the door in the air lock, about?

A. I think it was about thirty inches wide and not more than four feet high.

Q. 99. What was the consistency of the concrete used in lining the tunnels, including the arch?

A. It was dry concrete, not wet.

Q. 100. That is to say, concrete that has just enough water in it to hydrate the cement?

[fol. 219] A. Yes, just enough to mix, so that it will mix properly.

Q. 101. And that was placed in the forms, I understand you say it was rammed to solidify it?

A. Yes, tamped.

Q. 101a. Did the specifications under which you were working require that kind of concrete?

A. Those were the specifications.

Q. 102. Was the use of wet concrete permitted on that job?

A. It was not used in any place.

Q. 103. Did the city have anything to say about the nature of the concrete that went in?

A. They had everything to say about it.

Q. 104. Did they require the use of that kind of concrete?

A. That is what they required.

Q. 105. If wet concrete had been used at any time in the arch of the tunnel, what would have been the effect?

A. In the key?

Q. 106. Yes.

A. It would have fallen out, it would not have stayed up there.

Q. 107. It would not remain in place?

A. No.

Q. 108. How long did the Tunnel Company occupy that building at 177 East Monroe Street?

A. Up to 1912, I think; 1912 or 1913.

Q. 109. Were any pneumatic grout machines used in that tunnel and if so, when?

A. Yes, they were used in 1907.

Q. 110. And for what purpose?

A. For tamping leaks.

Q. 111. Was that the first time that any pneumatic machine of that kind had been used?

A. That I know of.

Q. 112. If any other machine had been used, would you have known of it?

A. I would.

[fol. 220] Q. 113. And where was that first use of the pneumatic machine?

A. That I know of, near the river between Madison and Washington Streets in the shaft.

Q. 114. What was that shaft called?

A. Jackson's Disposal Station, was the name of the shaft.

Q. 115. Have you any record of that?

A. I have.

Q. 116. And does that record show that pneumatically placed grout was first used at that time?

A. It states the day they started using it. It was the first time we used it, November, 1907.

Q. 117. Just describe briefly the machine that was used at that time in 1907.

A. It was a circular tank like a boiler about three feet high and thirty inches across, perhaps a little higher than that, with a top and bottom and a connection on top and a connection at the bottom, and it was filled with the grout almost up to the top, and then the opening was closed and the air was turned on from an air tank, and the grout was shot into the bottom opening through a two inch pipe into the walls of the shaft.

Q. 118. Where was the compressed air let in to place the grout?

A. Near the top.

Q. 119. Anywhere else?

A. No.

Q. 120. What kind of grout was used?

A. Pure cement and water.

Q. 121. Was sand used sometimes?

A. Not frequently, very seldom, not in that case.

Q. 122. Was any gravel used in that machine?

A. Never.

[fol. 221] Q. 123. Do you know how the electric light wires were taken in through the air lock?

A. They were taken through a small pipe through the air lock, about an inch pipe, I think.

Q. 124. How long was that pipe?

A. The length of the air lock. The air lock varied; about 20 feet at the most.

Q. 125. Then the pipe for the electric lighting wires was just long enough to extend through the air lock?

A. Through the air lock.

Q. 126. What was on each end of that pipe?

A. There was a nipple and that was closed up tight and taped to keep the air from escaping through the lock.

Q. 127. And the electric wires ran through that short pipe or tube into the air lock?

A. Yes.

Q. 128. How were the brackets which held the electric lights in the air lock fastened?

A. They generally consisted of a spike driven into the wall.

Q. 129. Driven into the concrete wall?

A. Yes.

Q. 130. Where did you get the compressed air to run that grouting machine in 1907?

A. From an air compressor on top, on the surface.

Q. 131. On top of the shaft?

A. Yes.

Q. 132. On the street?

A. On the sidewalk.

Cross-examination.

By Mr. Johnson:

X Q. 133. In this Plaintiff's Exhibit 15, if I understand correctly, that is your report of the condition of the building at 177 to 179 Monroe Street; is that correct?

A. Yes, sir.

X Q. 134. It is dated January 23, 1904. Did your com- [fol. 222] pany take possession of that building then, buy it?

A. We rented it.

X Q. 135. You rented it from that day?

A. I would not say that. That is the day that we inspected the condition of the building in order to see what was necessary to do in order to be able to occupy it. That is just the engineer's report to the president of the company showing the condition of the building at that time.

X Q. 136. How soon after the date of this report did you move into that building, sir?

A. Three months, I should say.

X Q. 137. Was the building fixed up before you moved into it?

9. Not entirely, no.

X Q. 138. What was done, sir?

A. The alterations were not complete. After we moved in they completed the alterations.

X Q. 139. What do you mean by "alterations," sir?

A. It was not built for an office building and we changed it into an office building. We changed one floor at a time and the other floor was changed into an apartment. Mr. Jackson was living there. It took quite a time after we moved in to complete the work.

X Q. 140. But that work was completed in three months; is that right?

A. No, I say we moved in in three months. The work was not completed, I do not think, in that year, even, the entire work up above.

X Q. 141. You mean the partitions above the first floor were not completed?

A. Yes.

X Q. 142. Was everything completed below the second floor, within, say three months?

A. I can not say that.

[fol. 223] X Q. 143. What is your best recollection?

A. I should say they worked for quite a time there. I could not say that they finished it on a certain day.

X Q. 144. I am not trying to pin you down to any particular day, Mr. Slade. I only want to know approximately when the alterations below, say, the second floor, were completed?

A. Oh, around June or July.

X Q. 145. Of 1904?

A. Yes.

X Q. 146. And the other alterations above the second floor were done shortly after that, I take it?

A. Yes.

X Q. 147. Before you moved in, the building was made sanitary and habitable, was it?

A. Partly so.

X Q. 148. You do not mean that you moved into a building that was not habitable, do you?

A. As an office?

X Q. 149. As an office or for any other use.

A. You might call it, what you mean by "habitable." You can have a swell office or you can have one that was not completed like mine was. Mine was not completed for a year and still I was there.

X Q. 150. I mean the ordinary meaning of that term, sir, and if you have any other meaning than that you can answer the question with that meaning in mind.

A. If I wanted to say what I think I would say we made the best of the conditions.

X Q. 151. When you moved in, then, the building was in pretty good condition?

A. Fairly good condition.

X Q. 152. I take it that when you moved in, it was not [fol. 224] unsanitary, at least?

A. It was not unsanitary.

X Q. 153. And it was clean?

A. We come back to the same old question of what you mean by being clean. It was not clean as compared to present-day meaning of clean.

X Q. 154. I mean so dirty as to be offensive?

A. It would never be passed as an office at best, when all the work was completed.

X Q. 155. What I am trying to bring out, sir, is when you moved in, the building was not so unclean as to be offensive?

A. No.

X Q. 156. I notice that on page 2 of Exhibit 15, of your report, you state that the condition of the basement was as follows: "Front half of basement is occupied by numerous families of cockroaches of such proportions that it would be impossible to give anything like an adequate description." Was that condition overcome before you moved in, sir?

A. I guess they got rid of the cockroaches.

X Q. 157. In the third paragraph of that phrase in relation to the first floor, you state: "Sickening odor of sewer gas pervades the rear portion, all in a filthy and unwholesome condition. A more minute description would simply end up with filth and rubbish. A fairly good-looking wash bowl and W. C."—is water closet, I suppose—"is at the

immediate rear of the general dining room." Was that condition also remedied before you moved in, sir?

A. Finally.

X Q. 158. You moved in in about three months, you said?

A. Yes, sir.

[fol. 225] X Q. 159. That would be about April, 1904?

A. As near as I can remember.

X Q. 160. I think you stated that you made a concrete connection with the basement of this building and the tunnel as shown in Exhibit 17. That was done, as I remember it, in June or July of 1904?

A. 1904.

X Q. 161. When was the basement of this building concreted, sir? At the same time?

A. Yes.

X Q. 162. So that the building at 177 East Monroe Street was concreted in June or July of 1904, according to your recollection?

A. I would not say that all of it was concreted at that time, no, sir.

X Q. 163. Was most of it concreted, sir? After you once started it, did you not complete the concreting?

A. The basement had tracks and so forth in it and I can not say what time we completed it.

X Q. 164. With the exception of the portion of the floor covered by the tracks, it was concreted in June or July of 1904?

A. I think so, but the tracks covered a great part of the basement.

X Q. 165. How far did you push out the tunnel from this basement, at what rate of speed were you travelling?

A. Building of the tunnel?

X Q. 166. Is my question correct? That is, you connected the basement with the tunnel. Had the tunnel already been built, sir?

A. Yes, sir.

X Q. 167. How long before had the tunnel been built, sir?

A. About two years.

X Q. 168. About 1902, then?

A. Yes.

X Q. 169. How long was the tunnel then; several miles?

A. Several miles.

[fol. 226] X Q. 170. About how many miles would you say?

A. I could not give you that.

X Q. 171. Could you give me any estimate?

A. 1904 was about the second period. It would be quite a number of miles, feet I mean, several thousand feet. I do not remember. My records would show it.

X Q. 172. But the tunnel extended several miles?

A. Yes, sir.

X Q. 173. When you were building the tunnel were you troubled with leaks in any way?

A. Water?

X Q. 174. Yes.

A. No, sir.

X Q. 175. You had no trouble with water at all?

A. In the tunnel, no, sir.

X Q. 176. Mr. Jackson to whom you referred was continually using new devices, was he not?

A. At times, yes, trying to.

X Q. 177. Might he not have used some devices that you did not see?

A. I do not think so.

X Q. 178. But it is possible, I take it?

A. I hardly think so.

X Q. 179. You would not want to swear positively that you saw everything that he was working on, would you?

A. I could pretty near swear, because if he had anything, I would be the first to know it.

X Q. 180. That is, you think he would have told you about it?

A. I would not have known if he had any reason to hide it, but anything that was worth anything, I certainly would have known it. If he had any improvements, since I made the estimates of the cost of the work, I would certainly be interested in knowing anything that would cut down the [fol. 227] cost, and I was pretty close to Jackson myself, having worked with him from the World's Fair in 1893.

X Q. 184. Do I understand that you swear that you saw every——

A. No, sir, I do not swear that. I said I could safely swear.

X Q. 182. But you do not?

A. Because he might have made an experiment out at some other place. I do not claim that I saw everything that Jackson did.

X Q. 183. Did you see everything that Jackson or anyone else tried out in these tunnels?

A. If it was an experiment of any importance, any size, I certainly did.

X Q. 184. Exactly what do you mean by "experiment of any size," sir?

A. If it lasted for several days. Of course, an experiment that lasted for an hour or two, I might not perhaps have seen it.

X Q. 185. Did you see the operation of the rammer?

A. I did not hear that.

X Q. 186. Did you see the operation of the concrete rammer in the tunnels?

A. Concrete rammer?

X Q. 187. Yes, sir.

A. I never heard of it.

X Q. 188. Would you swear that he never tried out a new concrete rammer in the tunnel?

A. No.

X Q. 189. How far is shaft No. 1 from the beginning of the tunnel work?

A. The beginning of the tunnel work?

X Q. 190. Yes, sir.

A. About 100 feet, I should say.

X Q. 191. Do you know anything about a Chicago Pneu- [fol. 228] matic Company hammer being used in that tunnel?

A. At what period?

X Q. 192. At any period?

A. I do.

X Q. 193. What period do you remember it?

A. We are using it now.

X Q. 194. When did you begin using the Chicago Pneumatic Company hammer?

A. About 5 years ago.

X Q. 195. You do not know the use of any Chicago Pneumatic hammer in the tunnel before five years ago?

A. Yes, sir, they used it before that.

X Q. 196. About how long before that?

A. About ten years ago, but we did not use it.

X Q. 197. But it was used in the tunnel?

A. It might have been; I will not say for certain.

X Q. 198. Was it used for any unusual purpose?

A. No, sir.

X Q. 199. It was used at least some ten years ago, is that it? Would that be the first use in the tunnel as far as you know?

A. I would not say that.

X Q. 200. It might have been used long before that?

A. We had pneumatic hammers for drilling holes in the tunnel walls quite a number of years, small machines for drilling a half inch or a quarter inch hole. The company has been using those right along.

X Q. 201. That is, from the beginning of the job?

A. No.

X Q. 202. About when?

A. The tunnel was constructed in different periods. During the construction period we did not use any of those instruments. Afterwards, when we started equipping the [fol. 229] tunnel for handling freight, about 1912 or 1914, then we used these new instruments.

X Q. 203. But a Chicago Pneumatic hammer might have been used in the tunnel for some purpose that you did not know about before that, might it not?

A. Not during the construction period.

X Q. 204. Do you know anything about a switch being tested out in the tunnel, sir?

A. A switch?

X Q. 205. Yes, an automatic switch, track switch.

A. An automatic switch?

X Q. 206. Yes.

A. We have a number of them.

X Q. 207. I mean a test of them many years ago, an experimental device?

A. I do not recall it.

X Q. 208. Did you ever hear of such an experiment in the tunnel?

A. An automatic switch?

X Q. 209. Yes.

A. I do not recall.

X Q. 210. I will ask you as an engineer, Mr. Slade, if your low pressure compressors could not have been built up so that you could get a higher pressure?

A. No, sir.

X Q. 211. You never knew that they were coupled up so that they would get additional pressure?

A. They were built the maximum 35 pounds, and a greater pressure they would not stand. They were only used for 10 or 12 pounds.

X Q. 212. Do you know if Mr. Fanning ever made cars for the Illinois tunnel?

A. I do not know—cars?

X Q. 213. Cars for the tunnel?

A. What kind of cars?

X Q. 214. Answer it in your own way, if you will.

A. Because we had various styles of cars.

X Q. 215. Any kind of cars?

[fol. 230] A. He might have made some small wooden cars, I would not pass on that.

X Q. 216. You would not know about that?

A. I would not know particularly, no.

X Q. 217. I have just found out that the cars that I referred to being built by Mr. Fanning were concrete cars, both wood and steel. Do you know anything about such cars being built by him?

A. No, sir, I do not know.

Mr. Cox: You do not claim they were built in the tunnel, do you?

Mr. Johnson: Oh, no.

X Q. 218. Do you know anything about a shield test being tried out in the tunnel?

A. A driving shield?

X Q. 219. Answer it in your own way, I leave that to you.

A. I do not understand the question.

Mr. Johnson: Read the question, please.

(X Q. 218 read.)

A. We tried one, yes.

X Q. 220. Describe it, please.

A. That was in the large tunnel, 13 or 14 foot tunnel. We drove a shield made of Jackson patented sheeting as it is called.

X Q. 221. Would you call that a test of an electric driven shield?

A. I knew nothing about that. We had no electric power.

X Q. 222. Are you familiar with the building of the tunnel for the Disposal Station?

A. Jackson's Disposal Station?

X Q. 223. Yes, sir.

A. Yes.

[fol. 231] X Q. 224. About what time was that?

A. 1906 or 1907; 1907.

X Q. 225. And that was connected to the Illinois tunnel?

A. Yes, sir.

X Q. 226. Did you have any trouble with water in that shaft?

A. Yes, sir.

X Q. 227. How did you overcome that difficulty?

A. By a grouting machine.

X Q. 228. What kind of a grouting machine?

A. Like the one I described. It is a tank with a connection on top and an outlet at the bottom, and that tank was filled with grout and shot in, refilled and shot in again.

X Q. 229. About how much pressure did you use?

A. About 100 to 125, around that.

X Q. 230. How far did you shoot the grout?

A. Shot it in the river. I have shot it right into the river.

X Q. 231. How far from the reservoir, say, did the hose run or would your pipe run?

A. A short distance.

X Q. 232. About how far?

A. I could not say; about 10 or 20 feet at most, through a two-inch pipe.

X Q. 233. That was shot through a two-inch pipe?

A. Yes, sir.

X Q. 234. And that stopped the leak?

A. Yes.

X Q. 235. When you got one bad leak in that tunnel, that leak was quite serious, was it not?

A. That is——

X Q. 236. And you had to get a grouting machine pretty fast, did you not?

A. Jackson got that. Jackson was doing that work.

X Q. 237. So that you are not familiar with it?

[fol. 232] A. I am familiar with it. I was there every day, but he was doing it by contract. That was his job, and it was his job to stop the leak.

X Q. 238. And Jackson got a grouting machine right away, did he not?

A. No, he did not, not according to my records, they did not show he got it right away.

X Q. 239. How long before he got it?

A. I do not recall.

X Q. 240. But he stopped that bad leak with a grouting machine, did he not?

A. Partly, and partly it was stopped by dumping clay in the river along-ide of where the leak was. It was stopped from the outside.

X Q. 241. Did you not also have trouble with water leaking into the tunnel under the Polk Street drift?

A. Yes, sir.

X Q. 242. And you had to grout that?

A. Yes, sir.

X Q. 243. And you had to grout that right away, did you not?

A. As soon as we could.

X Q. 244. And Jackson did that?

A. I do not know whether he did or not.

X Q. 245. Or Jackson's men?

A. I think Jackson's men, I am not sure.

X Q. 246. You also had trouble with the Marshall-Field Warehouse connection?

A. What would you call trouble?

X Q. 247. A bad leak, sir, water coming in the shaft?

A. At Marshall-Field's?

X Q. 248. Marshall-Field's connection?

A. We had no shaft in Marshall-Field's.

X Q. 249. Marshall-Field's Warehouse?

A. We had one.

X Q. 250. And that had to be grouted?

A. Yes.

[fol. 233] X Q. 251. And grouted quickly?

A. No, I won't say quickly.

X Q. 252. And Jackson did that?

A. He was working on that also.

X Q. 253. If you do not stop these leaks in the tunnel immediately there is so much water coming through with the cutting action that you are apt to have the tunnel seriously damaged, are you not?

A. We pump it out a- fast as it comes in.

X Q. 254. But the erosion action, you want to avoid that, do you not?

A. We never had any erosion action. The water does not cut the clay at all. We never had any trouble with erosion.

X Q. 255. You as an engineer know that the water does not come through the clay. It comes through pockets of gravel in the clay, does it not?

A. It might be through a seam, yes. We have maybe a seam of half an inch or a quarter of an inch in the clay, and it comes through that.

X Q. 256. So that the water comes down that pocket or the seam rather than through the clay?

A. It will not come through clay. Clay is water-proof.

X Q. 257. Do your drawings in relation to this tunnel have to be approved by the City Engineer of the City of Chicago?

A. All permits.

X Q. 258. Who was the City Engineer of the City of Chicago from 1919 to 1923?

A. Mr. Ericson, I think.

X Q. 259. Mr. Ericson from 1919 to 1923?

A. I will not say. I can not say that every permit was signed by Mr. Ericson. I would not say that.

[fol. 234] X Q. 260. Was he City Engineer during that period?

A. They were signed by a City Engineer. Whether it was Mr. Ericson or not, I do not know.

X Q. 261. Do you know P. S. Coombs?

A. He used to sign.

X Q. 262. Was he not City Engineer?

A. He was.

X Q. 263. And also was not Alexander Murdock City Engineer?

A. Yes.

X Q. 264. And then John Ericson was the City Engineer four or five years, is that so?

A. They say the others were not.

X Q. 265. What do you mean?

A. They claim that the other man had no right to be City Engineer during that period, especially Murdock, for instance. He was made City Engineer and it was found afterwards that he had no right to be City Engineer, but he signed as City Engineer.

X Q. 266. He actually occupied the office and signed the permits and so forth as City Engineer?

A. I could not say.

X Q. 267. Was it Mr. Ericson or P. S. Coombs, or Alexander Murdock?

A. Murdock signed some, I know.

X Q. 268. And Coombs signed some?

A. Yes. We are not interested in the name of the City Engineer.

X Q. 269. Was it not the general practice to first sink a small shaft from the basement so as to dispose of the excavation?

A. In the basement?

X Q. 270. A little working shaft, did not you build that first?

A. A working shaft? All of the work was done from a working shaft.

[fol. 235] X Q. 271. Then you might have put out a small working shaft before you ran the tunnel, might you not?

A. We had to.

X Q. 272. And there might have been an interval between the building of the tube?

A. No.

X. Q. 273. How long an interval would you say?

A. As soon as the working shaft was completed the other work was started. That would be the layout.

X Q. 274. How was air conducted through the tunnel when you operated pneumatic hammers?

A. We had an air compressor.

X Q. 275. You had a what?

A. An air compressor.

X Q. 276. Was the air compressor in the tunnel or was it outside and brought in by pipes?

A. No.

X Q. 277. Which way was it?

A. A small air compressor on the car.

X Q. 278. You used that in the tunnel?

A. Yes. That was not in during construction; there was none used during construction that way.

X Q. 279. Was there a reservoir tank on that tank, sir?

A. Sir, a small one.

X Q. 280. How high a pressure was that, sir?

A. That I could not tell you.

X Q. 281. It had to be something like 50 or 75 pounds to operate the hammers, did it not?

A. The hammers we used to operate at less than that.

X Q. 282. About what, sir?

A. I could not tell you that. Ours were only used after the construction and had nothing whatsoever to do with the construction period or Jackson.

[fol. 236] JOHN LYNCH, called as a witness on behalf of the plaintiff, in rebuttal, being duly sworn, testifies as follows:

Direct examination.

By Mr. Cox:

Q. 1. Mr. Lynch, where do you reside?

A. Chicago, Illinois.

Q. 2. What, if anything, did you have to do with the construction of the tunnels known as the Illinois Tunnels?

A. Inspector on them.

Q. 3. Well, for what?

A. For the City of Chicago.

Q. 4. During what years?

A. From February 1st, 1900, up to date.

Q. 5. During the period from 1900 to 1907 what were your duties as inspector?

A. To see that they had a permit for all work that was done, and did the work according to specifications, that is in the size and concrete used.

Q. 6. And what interest had the city in the construction of that tunnel?

A. There was an ordinance passed giving them the right to go under the streets, and they came under the supervision of the Commissioner of Public Works.

Q. And what was the object of your inspection, to see that the work was done?

A. That they did the work according to the ordinance passed by the City Council.

Q. 8. And did that ordinance contain specifications as to just how the work was to be carried out?

A. Not the ordinance.

Q. 9. Well, what?

A. The specifications were drawn in the engineer's office.

[fol. 237] Q. 10. The City Engineer?

A. As I understand it.

Q. 11. Was it your duty to see that the work was carried out according to specifications?

A. Yes, sir.

Q. 12. How often did you visit the tunnel during that period from say 1900 to 1907, inclusive?

A. My hours were from 1 P. M. to 11 P. M. only when I took off probably three hours in that time for lunch and dinner.

Q. 13. Were you on the job every day during that period?

A. Yes, sir, with the exception of once when I took a vacation.

Q. 14. Was it your duty to see everything that was going on in that tunnel?

A. Yes, sir. I and Mr. Northway, the other man from the Inspector's office. He was not an inspector, he was an engineer.

Q. 15. You were the inspector and he was the engineer?

A. Yes, sir.

Q. 16. Now, how was that tunnel lined?

A. By concrete.

Q. 17. Do you remember the section of the tunnel known as shaft No. 1?

A. Yes, sir.

Q. 18. How was that lined?

A. Concrete.

Q. 19. In any other way?

A. Not to my knowledge.

Q. 20. Well, if it had been would you have known it?

A. Yes, sir.

Q. 21. Were any machines used there for placing concrete or anything else pneumatically by compressed air?

A. I have never seen any of them.

Q. 22. If there had been one would you have seen it?

[fol. 238] A. I was in the tunnel, as I say, when they were concreting, and if there was a machine there I would cer-

tainly have seen it; and if I did not see it Mr. Northway would see it and also report to me.

Q. 23. You would have both seen it, would you not?

A. Yes, sir.

Q. 24. You reported to each other what you saw, is that it?

A. Yes.

Q. 25. And what one saw both saw or none saw?

A. Yes, sir.

Mr. Johnson: I object to that. This witness can not testify to what another man saw.

The Witness: I said he reported to me.

The Court: Overruled.

The Witness: He was on the job up to 1905. He was assigned in 1899 and while the work was shut down he was off.

Mr. Johnson: That is hearsay evidence. Let the witness testify.

Mr. Cox: I did not ask him anything.

Mr. Johnson: I move to strike it out.

Q. 26. Now, how was the work of excavation and lining that tunnel carried on?

A. The lining?

Q. 27. Yes, but what was the compartment in which the men were working and in which the work was done? How was it defined? How was it made? Was it under pressure?

A. Air pressure.

Q. 28. Yes, and that held the air pressure in the end of the tunnel in which the men were working and going forward?

A. Locks.

[fol. 239] Q. 29. About what was that pressure?

A. Between 10 and 12 pounds.

Q. 30. You had occasion to go in there frequently, did you?

A. Every day.

Q. 31. Were there any pipes going through any lock or into that lock?

A. There was about a three inch pipe between the locks for the air that went in the frame, that is above the door, and the pipe for the electric wires, an inch pipe.

Q. 32. Did that three inch pipe extend into the locked compartment?

A. Yes, sir.

Q. 33. How far?

A. Just inside the lock.

Q. 34. Just inside the partition?

A. Yes, sir.

Q. 35. And that conveyed a pressure of what?

A. About 10 or 12 pounds.

Q. 36. Ten or twelve pounds. Was there any other pipe running through the lock?

A. Not that I saw.

Q. 37. Well, if there had been would you have seen it?

A. Yes, sir.

Q. 38. Were there any other pipes running up to the place where the men were working or where the concrete was placed?

A. I never saw them.

Q. 39. Had there been any would you have seen them?

A. If it was at the time while I went in there. As I say, I was off once during that time on a vacation.

Q. 40. When was that?

A. Well, I think it was along in 1904.

Q. 41. How long was your vacation?

A. Only two weeks.

Q. 42. Two weeks, in the summer?

A. Yes.

Q. 43. Now, did they use any drills or other pneumatic machines in the tunnel during that period?

[fol. 240] A. Well, that I would not be interested in; only the construction of it.

Q. 44. Was it your duty to see just how the tunnel was excavated and how it was lined?

A. Yes.

Q. 45. And if any other method than that usually carried on had been used would you have known of it?

A. I think I would.

Q. 46. Do you remember the kind of concrete that was specified and required to be used on the lining of the tunnel?

A. Yes, sir.

Q. 47. What was it?

A. Do you mean the amounts? One, three, five.

Q. 48. What was the consistency of the concrete?

A. Dry.

Q. 49. Dry concrete. It was part of your duty to see that they put in nothing but dry concrete in there?

A. No, the engineer had charge of that end of it, Mr. Northway.

Q. 50. It was part of your duty to report what was done?

A. It was part of my duty to report what was done, but he took charge of that end.

Q. 51. Is this engineer that you mentioned, is he still alive?

A. No, he is dead.

Q. 52. You knew George W. Jackson, did you?

A. Yes, sir.

Q. 53. How well?

A. Oh, about as well as anybody could know him.

Q. 54. You came in contact with him how often during the construction of that tunnel?

A. Oh, most every evening I would meet him down in the tunnel, say three times a week.

Q. 55. During the time when you met him and were with him did you discuss the things that he was doing in the tunnel?

[fol. 241] A. Only just the work that was being done in the tunnel.

Q. 56. How were the keys of the tunnel lining placed?

A. Well, if they were going to bulkhead it they would pigeon-hole it; but if they were going to go straight ahead they would wait until the next day and put the lags in and fill about three feet and then concrete in that way.

Q. 57. Backwards?

A. With a shovel.

Q. 58. And after it was put in with a shovel, what did they do?

A. They would tamp it in.

Q. 59. Tamp it. Was any machine used for the purpose of placing that key while you were there?

A. Not that I ever saw.

Q. 60. If a machine had been used there for several days barring your short vacation, would you have known of it?

A. Yes, sir.

Cross-examination.

By Mr. Johnson:

X Q. 61. If I remember your testimony, you said you took a vacation of three weeks in 1904, is that right?

A. I said two weeks.

X Q. 62. In what time in 1904?

A. Well, that was in the summer time. That I could not recall now.

X Q. 63. Now, you were the City Inspector on that job, is that correct?

A. Yes, sir.

X Q. 64. Naturally, you were looking out for the interests of the city, I take it?

A. Yes, sir.

X Q. 65. Your main duty was to see what was going into the walls of the tunnel, and that it was up to specifications and complied with the specifications, for that job, is that right?

A. Partly, yes.

[fol. 242] X Q. 66. What other duties did you have, sir?

A. Well, partly right. I said partly. I was not held responsible for all the work, only part.

X Q. 67. What part were you held responsible for, sir?

A. For doing it according to specifications. Mr. Northway was there looking after the same kind of work that I was from the engineer's office.

X Q. 68. Then you had two inspectors in the job?

A. Mr. Northway was an engineer but he reported into the City Engineer's office daily what they were doing and how they were doing it.

X Q. 69. What did you report?

A. Every day into the Superintendent of Streets also. Two departments were taken in there.

X Q. 70. Did you report to the City Engineer?

A. I did the last six years, and before that time Mr. Northway, he used to report in there, and after Mr. Northway died, Jim Valley used to report in there.

X Q. 71. Then, if I understood you correctly, you had to see that the walls of the tunnels were built according to specifications, and that was the main thing that came under your duties?

A. Yes, and my instructions from the Superintendent of Streets were to see what they were doing in that direction and report in to him.

X Q. 72. And you reported every day?

A. To the Street Department.

X Q. 73. To the Street Department, and not the City Engineer?

A. No, sir, at that time.

X Q. 74. You were more interested in your duties than——

A. I will also state that Mr. Erieson at that time asked me to keep tab on what was going on, and drop in from time [fol. 243] to time and let him know along with his reports from Mr. Northway, which I did.

X Q. 75. How often did you drop in on Mr. Erieson, sir?

A. Oh, a couple of times a week.

X Q. 76. In his office?

A. Yes.

X Q. 77. And make out a written report or oral report?

A. Oh, no, just verbally.

X Q. 78. Just verbally?

A. That is all.

X Q. 79. During what years was that, sir?

A. That I reported into Mr. Erieson?

X Q. 80. Yes.

A. From 1900, that is when they were working from 1905 to about,—I mean from 1900 to 1905. That is when Mr. Northway was with me. After that Mr. Valley came on the job, and he reported into the Engineer's office daily, and I would just drop in occasionally then and have a talk with Mr. Erieson about how things were going on.

X Q. 81. Did you report personally to Mr. Erieson in his office during 1902, 1903 and 1904?

A. A couple of times a week when I would meet him, that is, when I met him coming through the hall or going to his office I would tell it to him.

X Q. 82. And you are positive that you made these reports to Mr. Erieson in these three years?

A. Yes, sir.

X Q. 83. From 1902 to 1904, inclusive?

A. Yes, sir.

X Q. 84. And you dropped into his office personally and saw him?

A. Yes, sir, that is the only way I could see him.

X Q. 85. And you did that during the year 1903, sir?

A. Yes, sir, as I recollect it.

[fol. 244] X Q. 86. Now, to come back again, you were not particularly interested in the equipment of the contractor as long as he did his work satisfactory, were you?

A. That was all.

X Q. 87. Now, the contractor might have been using a new device in that tunnel that did the work satisfactorily so that you would make no report on that or pay no particular attention to that?

A. Yes, I would make a report if there was any change in the method of putting in the concrete or in any way anything new or out of the ordinary I would report that to my superintendent.

X Q. 88. You would report on the apparatus?

A. Not the apparatus, but if they were doing other than the ordinary way I would report to my superintendent that they had changed the method of concreting, but I would not have anything to do with the machine or having anything to say about it. I would only report in about it and let them do it.

X Q. 89. Were there just two inspectors on this job, you and the other gentleman that is now deceased?

A. Do you mean during the whole period?

X Q. 90. Yes.

A. Oh, yes, at one time there was an inspector in every heading.

X Q. 91. Was not there an inspector named John Olis on that job?

A. Olis?

X Q. 92. Yes, sir.

A. I do not remember that name. I do not recall it. There might have been, but I do not recall it because there were seven or eight of them there.

X Q. 93. So that there were other inspectors there that you might not have known?

[fol. 245] A. Yes, only I went through every heading, that is between the afternoon and night, to see what was going on. But the other inspectors I did not pay much attention

to their names. Some of them I knew, one of them was Hugh Carr, and you got Valley's name, and Martin Hartigan. That was just for a short period. That was when Patterson was Commissioner of Public Works.

X Q. 94. Were there not several pipes lying along the floor of the tunnel going in?

A. During the construction work?

X Q. 95. Yes.

A. Not that I recall. There were pipes put in after for drainage purposes after the tunnel was completed and in those parts——

X Q. 96. Let me see if I understand you correctly. I am not talking about the heading, nor am I talking about after the tunnel was completed and turned over to the city. I do not mean that.

I mean were there not several pipes leading along the bottom as the work progressed for drainage and other purposes?

A. While the work was going on, do you mean? No, they put that in after they put in their concrete; track work, I mean.

X Q. 98. Well, are we speaking about the heading alone or are we speaking——

A. I suppose you are speaking about the sides, are you not, along the side?

X Q. 99. I am talking about the floor, sir, the bottom.

A. Yes. I never noticed any pipes in there, only for drainage purposes.

X Q. 100. And there were one or two of those?

A. Yes, as I recall it.

X Q. 101. Is it not customary and absolutely necessary [fol. 246] and usual to have a lot of spare parts all in the tunnel all along in case of emergency and these clutter up different portions of the side of the tunnel?

A. Only where they put their pumps in after the work is completed.

X Q. 102. They have to have timbers and loose pipe and a whole lot of things?

A. They would have pipes, and they would have timber if it was necessary if they met with spongy clay and sand pockets they would timber.

X Q. 103. They had emergency material on the side of the tunnel, on the side of the floor in case of emergency?

A. Yes, sir.

X Q. 104. Do you know Mr. Fanning who has testified in this case, sir?

A. Very well.

X Q. 105. He was one of Jackson's men, was he not?

A. Well, as I understand it, he was connected with the Bridge Department of the Jackson-Cordett Company. I got acquainted with John Fanning through Mr. Jackson and John Cordett. I never paid much attention to what direction he was working.

X Q. 106. You saw him around the tunnel pretty much every day, did you not?

A. No, sir, I did not.

X Q. 107. How often?

A. I would meet him in the evening once in a while, but I did not know he was connected with the tunnel. I thought he was connected with the Jackson Bridge Works.

X Q. 108. Did you ever see the tamper being used in the tunnel, sir?

A. No, sir.

X Q. 109. A concrete tamper?

A. No, sir.

Mr. Cox: What kind of tamper?

[fol. 247] X Q. 110. A pneumatic concrete tamper?

A. No, sir, I did not. I saw no tamper, only what we used by hand in the placing of concrete, with the shovel.

X Q. 111. You never saw a pneumatic tamper being used in the tunnel?

A. No, I did not.

X Q. 112. It might have been used without your having seen it?

A. Yes.

X Q. 113. Is that also true about an electric shield? Did you ever see that used in the tunnel?

A. Well, yes, at the later time I saw it.

X Q. 114. I am talking about this tunnel.

A. That is in connection with the tunnel. They had an incline run up where we hauled out our mud.

X Q. 115. What year was that, sir?

A. Anywhere between 1905 and 1908, as I recollect it. I would not be positive on the year, but they drive shields there, steel shields.

X Q. 116. But you do remember that experiment with an electric shield?

A. I do not know whether it was electricity that they drove it by. It was not an electric shield. Is that what you asked me, an electric shield?

X Q. 117. I am talking about a horizontal electric shield driven electrically.

A. No.

X Q. 118. You never saw that?

A. I never saw that. The only shield I saw there was on the lake front where they built this incline where they drove down.

X Q. 119. Did you ever see the automatic track switch that was built in the tunnel?

A. If I did, I did not pay any attention to it because that did not come under my work.

[fol. 248] Alfred J. Martin, called as a witness on behalf of the plaintiff, in rebuttal, having been duly sworn, testifies as follows:

Direct examination.

By Mr. Cox:

Q. 1. Mr. Martin, where do you reside?

A. Chicago.

Q. 2. What did you to do with the construction of the Illinois Tunnels in Chicago and when?

A. Since 1901 up to the present time.

Q. 3. Just tell us when you first saw a pneumatic placer used for placing concrete or grout.

A. Never saw any for placing concrete, but I saw one for placing cement in 1907.

Q. 4. And how frequently were you in the tunnel during that period up to 1907?

A. Every day.

Q. 5. What was your job? What did you do? What were you doing there?

A. At first I was laboring, working in the headings, then I worked at very other line of work they had, electric work, pipe work and everything.

Q. 6. In 1902, 1903 and 1904, do you remember what you were doing?

A. Mostly construction.

Q. 7. What did you have to do with the concrete work?

A. I hauled it there.

Q. 8. You supplied the concrete to the men who placed it in the forms?

A. I did.

Q. 9. Now, when you say you saw a machine used in 1907, tell us what that was.

A. It was a grouting machine. We used it over in the disposal station. It was a plant apparently about 30 inches [fol. 249] in diameter and about 4½ feet high, four feet high.

They had an air connection on top and discharge on the bottom. I operated the plant myself.

Q. 10. What air pressure did you use?

A. From 100 to 125 pounds pressure.

Q. 11. When did you operate that plant and under whom were you working?

A. I. J. Crowley.

Q. 12. Who was the contractor?

A. George W. Jackson.

Q. 13. Was there any air inlet to that tank except in the top?

A. No, sir.

Q. 14. Did you have anything to do with the work at the Polk Street Tunnel?

A. I did. I worked on that job also. I was the one that poured the grout into the bottom of the tunnel. I worked on it 24 hours without stopping at one time.

Q. 15. When was that?

A. That was in 1907 also.

Q. 16. Now, state how the grout machine resembled if at all any of these machines shown on Exhibit E?

A. It resembled the exhibit shown on A.

Q. 17. There is an "A" on each figure. Was it 3, 4, or 5?

A. 4.

Q. 18. Now, how about the air inlet?

A. No, there was only one inlet, one outlet and that was on the bottom.

Q. 19. How about the air inlet, where was that?

A. The air inlet was on the top.

Q. 20. None along in here (indicating)?

A. No, sir.

[fol. 250] Q. 21. And both of those were Mr. George W. Jackson's jobs?

A. Yes, sir.

Q. 22. Did you ever see a grouting machine used before that?

A. No, sir.

Q. 23. What was the grout that was used, what mixture?

A. Cement and water.

Q. 24. Was sand used at all?

A. A little sand was tried out but did not work right, did not push far enough, and it would clog up the pipe too easy on account of the heft of the sand, so we discontinued the use of sand, and used cement and water entirely right along on the job.

Q. 25. What was the size of the discharge pipe on the bottom?

A. Two inch reduced down to whatever hole we had made.

Cross-examination.

By Mr. Johnson:

X Q. 26. Mr. Martin, if I understood you correctly, sir, you only saw a machine like figure 4 of what we call here Exhibit I, is that correct?

A. Yes, sir.

X Q. 27. That was when, sir?

A. 1907.

X Q. 28. Have you fixed that date definitely in your mind?

A. I have fixed it definitely in my mind.

X Q. 29. Now, prior to that, if I understood your testimony correctly, you were a laborer in the heading?

A. I was a laborer at the start, yes, sir.

X Q. 30. And you did whatever you were told to do by the——

A. Whatever my boss told me to do, I did, whatever the job was I did.

X Q. 31. Do I understand you were there every day?

A. Every day.

[fol. 251] X Q. 32. Right through?

A. Yes, I have entered that tunnel now about 7,800 times not including Sundays and holidays and lots of them. About 7,800 times.

X Q. 33. 7,800 times?

A. Yes, 7,800 times.

X Q. 34. What pressure did you use on this device that you just testified to?

A. 100 to 125 pounds air pressure.

X Q. 35. Where did you get it?

A. According to how the material went through the wall and where the leak was.

X Q. 36. Where did you get the air pressure?

A. Got the air pressure from an air compressor. The air pressure was made by an air compressor into another tank and this tank fed this grouting tank according to how you wanted it.

X Q. 37. About 125 pounds to the square inch?

A. About 100 to 125 pounds, yes, sir.

X Q. 38. Was that on a truck or not?

A. It was; it was on a car.

X Q. 39. Could be run in and out?

A. In and out on the track.

X Q. 40. Did you ever see a tamper?

A. Yes, sir, I have used them.

X Q. 41. I do not mean the hand tamper, sir; I mean a mechanical tamper.

A. No, sir, what do you mean? What did I see it outside?

X Q. 42. No, I mean in the tunnel.

A. No, sir.

X Q. 43. Did you ever see a pneumatic tamper in the tunnel?

[fol. 252] A. No, sir.

X Q. 44. Did you ever see an automatic track switch tried out in the tunnel?

A. No, sir.

X Q. 45. Did you ever see an electric shield tried out in the tunnel?

A. I never seen it; I know it was tried out.

X Q. 46. Oh, you know that?

A. Yes, sir, tried out on one of our big boards on State and Lake Street, that is the exact location.

By Mr. Cox:

R. D. Q. 47. What is your present position with the Tunnel Company?

A. I am superintendent of the Maintenance Department.

Earnest A. Clark, called as a witness on behalf of the plaintiff, in rebuttal, being duly sworn, testifies as follows:

Direct examination.

By Mr. Cox:

Q. 1. Where do you reside, Mr. Clark?

A. Chicago, Illinois.

Q. 2. Were you ever connected with George W. Jackson?

A. Yes, sir.

Q. 3. What branch of his business?

A. First from 1902 to 1906 in the bridge steel department, and after that with George W. Jackson, Incorporated.

Q. 4. How long were you with him after that?

A. To 1912 or 1913.

Q. 5. Now, were you in the office of the Jackson Cordett [fol. 253] Bridge Works?

A. A part of the time.

Q. 6. During what period?

A. A part of 1903 and the early part of 1904, if I remember rightly, and after that we moved downtown to the Rookery Building, and were there to 1906, and we moved across to what is known as 754 West Jackson.

Q. 7. While you were with Mr. Jackson did you have anything to do with the making of the pneumatic machine for placing grout or something of that sort?

A. I made one of them after 1906. I could not place the exact date. I know we made it in the rear of Boston Avenue, in the place there.

Q. 8. By the way, what was your position with Jackson?

A. Chief Draftsman and Engineer.

Q. 9. This tank you say was built after 1906?

A. After 1906.

Q. 10. Just describe it.

A. It was built out of—the first one we made was built of pieces of cast iron pipe about twelve inches in diameter and about three and a half or four feet long, with a flange in the top and bottom. That is a flat flange, and the bottom flange had an opening in the center, about a two-inch opening, and the top—the first flange that we made up though had no opening but had an opening in the side of the pipe near the top, a three-quarters of an inch opening, if I remember right.

Q. 11. That was the first one you built?

A. That was the first one we built.

Q. 12. That was after 1906?

A. Yes, that was after 1906.

[fol. 254] Q. 13. What became of that?

A. They used that in some part of the tunnel work at that time, but they found out it was not practical to use it.

Q. 14. Was another one built?

A. Either another one built or purchased. I would not say positively in regard ot that.

Q. 15. Just describe that other one.

A. The other machine was a steel tank with a cone bottom. I would say it was about 18 or 20 inches in diameter, about 4 feet high and set on iron legs, with an opening in the top, on the side near the top for air; and there was an opening on the end of an elbow, or an opening in the nipple, a short nipple in the elbow, in the bottom of the machine projecting out past the outside of the machine was a shut-off valve.

Q. 16. Where was the air supplied to this tank, now, to both of them you have mentioned?

A. The air was supplied on the cast iron pipe machine, it was applied near the top on the side, and the same, about the same place on the other machine.

Q. 17. Were these the first articles of the kind that you had ever seen Mr. Jackson make or have bought or anyone connected with him?

A. Yes, sir.

Q. 18. Now, you say that you made the first tank at the shop after 1906.

A. It was assembled. We bought the pipe. Practically it was standard pipe.

Q. 19. Now, tell us how you made that unsatisfactory machine that you made after 1906, as well as what you had to go by.

A. Mr. Jackson gave me some sketches to go by.

[fol. 255] Q. 20. What did you do then?

A. Completed his sketches and then ordered the materials for it.

Q. 21. The second tank that you mentioned, how did it resemble any of the figures on this drawing, Exhibit E?

A. It was something similar to No. 5. That is, it was not the same as that one either. It was about the same shape as No. 5. If I remember right, the opening came in from the side there. The pipe there shown coming in from the top came in from the side near the top. And there was an elbow at the bottom, and there was a pipe connected to that elbow.

Q. 22. For what?

A. For discharge.

The Court: What was the first one like?

The Witness: The first one was not like either of those sketches.

The Court: What was it like?

The Witness: It was a piece of flange pipe, cast iron pipe, about three and a half or four feet long, twelve inch pipe, with a flat cast iron flange on both the top and bottom.

By Mr. Cox:

Q. 23. And that you say was made under Mr. Jackson's instructions from his sketches?

A. Yes, sir.

Q. 24. Now, in this one that you say resembled Fig. 5, where was the inlet, or where was the air inlet in the tank?

A. The air inlet in the tank was in the side near the top.

[fol. 256] Q. 25. Anywhere else?

A. Not to my knowledge.

Q. 26. Can you say whether there was any bottom inlet or lower inlet for air?

A. I do not remember of any.

Q. 27. And that was what date, after 1906?

A. After 1906.

Cross-examination.

By Mr. Johnson:

X Q. 28. Mr. Clark, your chief duties, as I understood from you, were that of being Chief Draftsman for Mr. Jackson.

A. Not as Chief Draftsman, but I worked for the Bridge & Steel Works. Mr. Jackson was not around there very much at that time.

X Q. 29. Then I am afraid I do not get just exactly the connection you had with Mr. Jackson.

A. The Jackson Cordett Steel Works was a corporation engaged in steel construction work.

X Q. 30. And you were Chief Draftsman of that concern?

A. I was Chief Draftsman of that concern.

X Q. 31. And that was separate and distinct from the tunnel?

A. Yes.

X Q. 32. And your business was with the Steel Works?

A. My business was with the Bridge & Steel Works up until 1906.

X Q. 33. For whom were you Chief Engineer?

A. I worked for Mr. Fanning.

X Q. 34. The Mr. Fanning in the room who has previously testified?

A. John T. Fanning.

X Q. 35. Is it not true that Mr. Jackson got up different forms or devices that he tried out?

A. A great many of them, yes, sir.

[fol. 257] X Q. 36. And was it not his custom to try out a device before he had the drawings, elaborate drawings, made, so as to test the article that he wanted to see how it worked?

A. It was.

X Q. 37. So that when he had drawings, and had you make drawings, in 1906, following his usual procedure, he had tried out that device before he had you make the drawing?

A. No, the drawings I made at that time were pencil sketches.

X Q. 38. But it was customary for him to have a device made up and tested before he had any drawings made?

A. He usually made a model.

X Q. 39. He made a model and tried it out to see if it was practical?

A. Yes, sir.

X Q. 40. Your duties did not require you to go down into the tunnel, did they?

A. Very seldom, unless it was to take some measurements for some steel works.

X Q. 41. And that was very seldom that you went down?

A. It was very seldom I went down, yes, sir.

X Q. 42. You never saw any pneumatic concrete tamper employed in there?

A. No, sir.

X Q. 43. Nor did you ever see an electric shield operating in the tunnel?

A. We built up some steel shields for use in the tunnel.

X Q. 44. Horizontal shields?

A. Horizontal shields, and we also made a short section of steel sheeting that was used in certain sections of the tunnel.

X Q. 45. Are we both referring to horizontal shields?

A. We are both referring to horizontal shields.

[fol. 258] X Q. 46. Were they both Jackson's inventions?

A. I do not know that you would call them inventions?

X Q. 47. Were they electrically driven?

A. No, they were not electrically driven; they were jacked into place, as I remember.

X Q. 48. Did you ever see an automatic switch signal used in the tunnel?

A. I never saw it used in the tunnel; I saw it used in the plant.

X Q. 49. You believe it was later taken to the tunnel and tried out?

A. I could not say in regard to that; I could not remember.

X Q. 50. That was one of the things Jackson was working on?

A. As I remember it, it did not prove very satisfactory.

X Q. 51. It was tried out?

A. It was tried out.

X Q. 52. It was tried out in regard to the tunnel?

A. I could not say in regard to that.

X Q. 53. Was it not customary for him to try out the device wherever he was expecting to use it?

A. Wherever he happened to be at the time.

X Q. 54. Did he not give it a practical test wherever he was to use it?

A. If I remember, the machine was not satisfactory in the test he made at the plant.

DEFENDANT'S PROOFS CONTINUED

JOHN ERICSON, called as a witness on behalf of the defendants, having been duly sworn, testifies as follows:

Direct examination.

By Mr. Johnson:

Q. 1. Mr. Ericson, in your examination yesterday, more particularly Q. 15, you said that you had been City En-
[fol. 259] gineer for the last 30 years next spring?

A. Yes, sir.

Q. 2. Were there not gaps in your term as City Engineer?

A. No, sir, not in my rights as City Engineer. My duties were changed from 1919 to 1923. I was induced under duress to allow my title to be changed by the Corporation Counsel, who after I came back ruled that anybody that occupied that position under my title was a usurper, and I never lost time as a civil service man. I passed as a civil service man in 1898 as City Engineer, and nobody could take that right away from me except by trial and dismissal.

Q. 3. What I want to make clear, sir, is were there not intervals when you did not act as City Engineer in fact?

A. Yes, that is true.

Q. 4. When was that, sir?

A. It was, I think it was a short period from 1902 in the fall into the spring of 1903 when Mayor Harrison wanted me to act on the Board of Local Improvements for certain purposes for a short time, but I never relinquished my rights and title as City Engineer.

The Court: Do not talk about your rights and title. We want to know when you were on the job there and doing something so that you could observe these things.

The Witness: Then from 1919, on November 1st about until May, 1923, when I was acting as consulting engineer I was around the office from time to time, but I was not actually acting as City Engineer during that time.

[fol. 260] Q. 5. Who was on the job as City Engineer in fact during 1903 and 1904?

A. My first assistant. His name was John Spangler.

Cross-examination.

By Mr. Cox:

X Q. 6. What were you doing in 1903 and 1904, your actual duties?

A. I was a member of the Board of Public Improvements. That had particularly to do with street improvement work, but I visited the City Engineer's Office practically daily, but I was not acting really actually as City Engineer during that time; that was about six months.

X Q. 7. You kept track of the work in that office during that period?

A. Yes.

Redirect examination.

By Mr. Johnson:

R. D. Q. 8. You made no inspections during the period you were not in fact the City Engineer in 1903 and 1904?

A. I went along sometimes on some inspections but not like I used to do while I was in active service.

WILLIAM ARTINGSTALL recalled.

Direct examination.

By Mr. Johnson:

Q. 470. You heard the testimony given by witnesses for plaintiff, did you not?

A. Yes, sir.

[fol. 261] Q. 471. I call your attention to Plaintiff's Exhibit 15 dated Chicago, Illinois, January 23, 1904, and ask that in view of that written document, what date you would say you saw and conducted experiments with these different exhibits you have previously testified to, figures 4 and 2 of Exhibit E. Just about the dates.

A. The figure 2 would undoubtedly have been in 1904.

Cross-examination.

By Mr. Cox:

X Q. 472. How was the concrete or whatever it was mixed that was placed at 177 East Monroe Street in this machine shown in figure 1?

A. Well, it is my recollection as I pictured it before——

X Q. 473. How was it mixed before it was put in the machine, by a mixer?

A. No, just with a shovel.

JOHN T. FANNING recalled.

Direct examination.

By Mr. Johnson:

Q. 271. You have heard the testimony given by Plaintiff's witnesses in the last day, have you not?

A. I have.

Q. 272. I call your attention more particularly to the Plaintiff's Exhibit 15, dated January 23, 1904, and ask you what you have to say as to that exhibit in connection with the dates that you have given for the machines, such [fol. 262] as you built, figures 3, 4, and 5 of Exhibit I.

A. I would say I was possibly mistaken in my date.
Q. 273. What date was it then?
A. Not later than 1904.
Q. 274. Not later than 1904?
A. Yes.

Mr. Cox: No cross-examination.

JOHN J. KENNEDY, called as a witness on behalf of the defendants, being duly sworn, testified as follows:

Direct examination.

By Mr. Johnson:

Q. 1. Will you please give your name, age, residence and occupation?
A. John J. Kennedy; 59; 214 West 92nd Street; contractor.
Q. 2. Are you an officer of the Powers-Kennedy Contracting Corporation, one of the defendants in this suit?
A. Yes, sir.
Q. 3. What practical experience have you had with concrete and concrete construction?
A. Over 35 years.
Q. 4. Did you do some of the concrete work on one of the old subways?
A. Since 1900.
Q. 5. And what job is the Powers-Kennedy Contracting Corporation doing now?
A. Queensboro extension.
Q. 6. Are they using concrete there?
A. They are.
Q. 7. Who is in charge of this work?
A. I am.
[fol. 263] Q. 8. Do you use a concrete blower on that job?
A. We do.
Q. 9. In your own way I would like you to state as briefly as possible when you installed this concrete blower, how it operated, and if you had any trouble with it, and then any changes that you made in it. Tell the story just as you told it to me.

Mr. Cox: I do not see the materiality of this. It is perfectly evident to everyone that they have used the device of the patent, lock, stock and barrel, and the majority of the claims cover that device. If they have been able to do something with it that nobody else did, I do not think that it is material on the question of infringement.

Mr. Johnson: We show absolutely, sir, that we do not operate under the terms of the patent. We can not show this without the testimony of this witness.

The Court: Objection overruled.

Mr. Cox: You do not deny that you use the structure?

Mr. Johnson: Decidedly, we do.

A. We started concreting in the 42nd Street tunnel in December, 1922. I had made a lot of inquiries before we started about securing some method of putting concrete over the arch forms and in the side walls of the tunnels that would be different than any that had ever been used in New York to my knowledge.

I heard of several different ones. Among the number was this one that Mr. Flack was interested in. He came and saw [fol. 264] me and told me all about it. We decided to try it and he brought it over from the shop. We installed it in Park Avenue, and I think it was the day after Christmas, or two days after we started to blow——

Q. 10. What year?

A. 1922. When we first started with it I knew very little about blowing concrete with a machine. I had never used it before, but I knew enough about mechanics to know that if we had air pressure enough to raise the concrete we wanted, we would have to use in there as high as we needed to do it if we could find a scheme that we could use.

We installed this thing and the engineers in charge of the subway construction in New York have always been wedded to very dry concrete. They wanted it quite dry, so much so, that you would have to ram it. We tried to blow it to their satisfaction with this blower when we installed it, and we had a tremendous lot of trouble. I made some study of it, and found that the dry concrete would clog in the pipe. The friction on the side of the pipe——

Q. 11. Wait a minute. I show you two Court exhibits and ask if they correctly illustrate the structure and opera-

tion of the blower that you installed and have used in the subway extension that you have testified to.

A. The first one as it is shown there was not as we got it. The top pipes are not shown there.

Q. 12. No, they are cut out.

A. Outside of that it is what we are using today.

Mr. Johnson: I introduce in evidence the drawings just referred to.

[fol. 265] (Marked Defendants' Exhibits J and K.)

The Witness: K is perfect.

By the Court:

Q. 13. What does Exhibit K illustrate?

A. The discharge at the end of the line where the concrete comes up and blows through that opening.

By Mr. Johnson:

Q. 14. Will you please——

A. I have not gotten through with my answer.

(A. to Q. 10 repeated to the witness as far as it went.)

A. (continued). —and the weight of the concrete for the distance we had to blow it was too much for the pressure that we could apply. We could not get more than 80 pounds pressure.

Q. 15. Will you please come down and mark these parts as you talk?

A. 30 is the discharge pipe. When we had the dry concrete in the side of the tank, 31, the concrete came down in the discharge pipe, 30, and it was so heavy that before it would reach the line of discharge shown on this other figure, 32, the pipe would plug up. I did not understand at the time why it was, but we afterwards found that we had too much weight in there for the amount of pressure that could be applied from 33.

So I decided to try it with a liquid concrete. As it was, we could not use it to any advantage because it would take more time to take the pipes apart and make it so expensive [fol. 266] that we could not use it at all.

Then we increased the quantity of water we put in the mixture until we made a liquid concrete that would flow, and we cut out the top feed valve so that the pressure on the top of the mass was not pushed down too far.

Q. 16. Is this the top feed valve, No. 35 (indicating)?

A. Yes. Ever since then, when we opened the valve on the red line——

Q. 17. Valve 36?

A. Right. We found we had no trouble at all to blow the concrete. As a matter of illustration, in the discharge pipe from the bottom, I have had as high as fourteen 90-bends between the machine and the point of discharge at the other end.

Q. 18. 32?

A. 32. The reason we had to have so many 90's is that we were putting concrete in a very difficult heading and you could not run a straight line for any great distance.

With the liquid concrete I had no trouble with the bends. As a matter of fact, we blew the concrete for, I think, 1,160 feet and raised it vertically 67 feet above where we started, after the liquid concrete was being used. Previous to that when we had a straight line for 330 feet we could not blow the dry concrete with the machine at all. The pipes plugged up continuously.

By the Court:

Q. 19. Do I understand, Mr. Kennedy, that you used this dry concrete after you had made this change and taken out your top pipe?

A. No, your Honor, we could not.

[fol. 267] By Mr. Johnson:

Q. 20. You used wet concrete after that?

A. Yes, sir, it could flow.

By the Court:

Q. 21. So never with any device did you operate with a dry concrete?

A. I could not. It could not be done, I think, but that would be open to another mechanics question. But the pressure we had was only 80 pounds, and to raise concrete 60

feet, you would have to have an overcoming pressure on the other end that would blow the pipes all to pieces.

Q. 22. That is what you did, raised about 60 feet?

A. 60 to 67 feet. We only used the liquid concrete, though.

By Mr. Johnson:

Q. 23. How long did you attempt to use the dry concrete in the blower shown on Exhibit J, Fig. 2?

A. About 15 minutes after we started, maybe a half hour. The engineers of the Department here in the City are wedded to concrete quite dry. What I mean by dry concrete must be understood by concrete people that it is not really dry. It is a thick mass that is damp, that requires plugging and tamping a good deal. They did not want me to use a liquid concrete at all under any circumstances. As a matter of fact, I had to agree, in order to get a chance to use the machine for the blowing, I had to agree with the engineers that if the concrete would not hold up to the re-[fol. 268] quirements of the pressures of the City, that I would dig out that which I had already placed and put it in there to their satisfaction. With that arrangement they allowed me to go ahead.

They sent tubes to Columbia University to have them tested, and our liquid concrete, when it was set, showed a higher pressure than any they had done by any other contractor in the City. I believe I have the figures in the office.

So after that they permitted us to use liquid concrete right straight through.

Q. 24. After you shot some of this dry concrete and it plugged up in the discharge pipe on 30, what did you have to do to get it out?

A. Take the pipe apart, stand it on one end and hammer it clear.

The Court: What difference does that make, what he had to do afterwards?

Q. 25. So that you never used dry concrete in this device except as a trial?

A. A regular trial.

Q. 26. Would you recognize photographs of the actual machine blower that is on that job (handing photograph to the witness)?

A. Yes; I believe I was there when that photograph was taken.

Q. 27. These photographs are correct, Mr. Kennedy?

A. They are correct.

Mr. Johnson: I offer them in evidence.

(Marked Defendants' Exhibits L, M and N, respectively.)

Q. 28. When were these photographs taken?

A. I think it was last spring sometime.

[fol. 269] Q. 29. When this machine was first installed, Figs. 1 and 2 of Exhibit J, did they have connections for placing air under pressure above the mass in the container, 31?

A. They surely did, yes.

Q. 30. Did you use that at first or not?

A. We did.

Q. 31. For how long a period?

A. Very short. We found that it pressed the concrete down into the pipe too fast to discharge it, the pressure that we had, and we could not use it.

Q. 32. What did you do then?

A. Cut it off. We made the concrete liquid and then we did not have any trouble anymore.

Q. 33. But you did not use the top air after you used the liquid concrete?

A. No, sir. It is obvious that liquid concrete will flow down by itself without any pressure.

Q. 34. About when did you stop using the upper air, then?

A. My man is here that was on the machine. It would be hard for me to tell you exactly. But I do not think the top pipe stayed on there much more than 3 months after we started.

Q. 35. You mean you did not use it, but it stayed there?

A. That is right.

By the Court:

Q. 36. Did you have gravel or coarse stone in there?

A. Yes. The aggregates of the concrete we are using

is gravel not larger than will pass through an inch and a half ring, and it grades down from that to three-eighths of an inch, gravel, sand and cement.

[fol. 270] By Mr. Johnson:

Q. 37. What proportion, sir?

A. One cement, two sand, and 3.85 gravel.

Q. 38. Do you remember Mr. Morgan and myself going up and inspecting this device in the tunnel last spring?

A. Yes, sir.

Q. 39. And you stated that you used it without the upper air pressure?

A. Yes.

Q. 40. We asked you then why did you not actually cut out the pipe and disconnect it, do you remember that?

A. Well, it was a matter of neglect. It was left there. We did take it off.

Q. 41. You did take it off then, did you not?

A. Yes, sir.

Q. 42. And then you operated the blower in exactly the same manner that you had for several years?

A. Just the same. It was taken off, I think, before the photographs were made.

Q. 43. And these photographs show the blower actually blowing the wet concrete?

A. Absolutely, yes.

Q. 44. I call your attention more particularly to Exhibit N, to the discharge pipe, 30, and ask you how that concrete is coming out of that discharge pipe in that photograph?

A. It is apparent that it is liquid.

Q. 45. Is it coming in slugs?

A. Oh, no.

Q. 46. Or segments?

A. No.

Q. 47. Or wads?

A. No.

Q. 48. Will you mark it with the letter "C," please, the liquid that is coming out?

A. (Witness does as directed.)

Mr. Cox: I think we are wasting a lot of time with this. It is utterly immaterial.

[fol. 271] Q. 49. How would you say that concrete was forced out of this exit pipe, 30?

A. There is no air in the pipe, 30, when the concrete is dumped in from the hopper overhead. Consequently, the concrete goes right down through into the discharge pipe, as you can see. It fills the discharge pipe above the offset. The offset is that bend on the outside, 37. You fill it above that. When you open the valve, 36, on the red line, a current of air is blown through the pipe, through the discharge pipe, and the air will appear at the discharge before we get any concrete of any kind. It flows right straight through, it travels faster than the material, but it brings the material with it, and she starts to feed down, and immediately after we get any concrete, any out of the end of the pipe, the discharge end, it comes right along, the air and concrete all mix up together.

Where the discharge pipe enters into the form, it is above or away from the body of the concrete underneath and the air that blows the concrete through the pipe is discharged before it strikes the body of the concrete underneath, so that there is no possibility of making the concrete porous from the air that is used in the pipe to discharge the concrete.

Q. 50. In this last portion of your answer, are you now referring to Fig. 4 of Exhibit K?

A. Where the discharged concrete comes out of the line, yes.

Q. 51. The concrete does not come out of the end of the pipe?

A. Not in that case. We have had it come out of the end where we have blown the concrete in the roof arch of the tunnel.

[fol. 272] Q. 52. But in either case the air is permitted to escape?

A. Yes.

Q. 53. So that there is no porous concrete?

A. Yes, sir, that is right.

Q. 54. The end of this discharge pipe is plugged or closed, is it not?

A. It is. It is a fitting screwed on the end of the pipe.

Q. 55. And the concrete comes out of a slit in the side of the pipe?

A. Yes.

Q. 56. From your experience with handling concrete, how would you say, by what method that liquid concrete was forced through that pipe?

Mr. Cox: I object to that. That is mere loose guess work.

The Court: I will allow him to say what he thinks.

A. There is not any question in my mind now as to how it travels to the pipe. There is very little friction while the pressure is on, because the concrete and the air is in flight from the bottom of the machine to the point of discharge.

How I could prove that to you is that when we take the pipes apart, if it was sliding along on the pipe, the bottom of the pipe would wear out. I have, time without number, put my ear down on the pipe and my hands underneath, and you can hear it flying through without any greater friction in one pipe than in another.

As a matter of fact, the pipes that I have used nearly four years in discharging concrete from the blower I have sold to the second-hand man to be used elsewhere. If any concrete was floating along like dry concrete in the pipe, it [fol. 273] would rub on the bottom of the pipe and would wear the pipe out very shortly.

That was proven by the bends that we get, where even the liquid concrete in flight where it strikes a 90, it would have to go around a corner and the body of concrete in flight strikes against the bend, and one of those bends does not last much longer than a shift of eight hours.

So I designed a 90 of cast iron that was extraordinary heavy. We prepared for a patent on it. We have managed to use those 90's six months with the concrete going through continuously before they wear out. That is, where the concrete comes up, gives it a blow, turns its direction, and gives it another blow, while in the main line we have never had a hole in the main line pipe.

Q. 57. When you speak of the concrete being in flight in the discharge pipe, 30, exactly what do you mean by that; that it is floating on the air in that pipe?

A. Oh, yes, positively. The air and concrete is one mass that does not completely fill the pipe until it strikes the bend. Then the quantity of water and sand and cement

gathers there and it has to be lifted until the air blows through it again and takes it right around the next bend in flight without stopping. If it was dry it would plug.

Q. 58. You mean if it was not floating on the air it would plug?

Mr. Cox: I object to that. Counsel is trying to put words into the witness' mouth.

The Court: Go on.

[fol. 274] Q. 59. In these photographs, Mr. Kennedy, Exhibits L, M and N, the upper air connection is positively disconnected, is it not?

A. I am positive, yes.

Mr. Cox: Your Honor, I have made repeated requests and propounded repeated interrogatories, trying to learn something about this machine. I am going to ask that we be given the privilege of looking at these machines before we proceed with the cross examination of these witnesses who have prevented us from seeing the machine and now come in and testify as to its construction and operation.

Mr. Johnson: I have no objection to it, your Honor.

The Court: Can you arrange to go up this afternoon?

Mr. Johnson: Yes, sir.

Mr. Cox: You have three machines and one is operating?

The Witness: Yes.

(Adjourned to October 8th, 1926; at 10:30 A. M.)

JOHN J. KENNEDY resumed.

Direct examination.

By Mr. Johnson (continued):

Mr. Johnson: I want to show that after adjournment Mr. [fol. 275] Kennedy went up and showed us the operation of his device to show clearly by a short examination that there is no infringement; and if you will just permit him to state what was shown these other gentlemen at that time I think it will elucidate the situation.

The Court: All right, state it as quickly as you can.

Mr. Johnson: Yes.

Q. 60. Mr. Kennedy, did you after court adjourned yesterday let opposing counsel inspect your blower in operation?

A. I did.

Q. 61. While we were gathered at Forty-first Street and Broadway where you are excavating the subway, did you call my attention, and the attention of Mr. Cox, and the chief engineer, Mr. Kirkland, and Mr. Ray and other members of the party to several lengths of iron pipe extending along the gutter on Forty-first Street?

A. I did.

Q. 62. Now, in your own way please state what this pipe was, what it was used for, how long you had used it, where and why it was up in the street and not in the subway.

A. We started to buy pipe in 1922, and for about two years the work progressed beyond where the machine was and we had to buy more pipe as the line got longer. For about two years we bought pipe at different times, but we have bought no pipe that I have any knowledge of in the last two years, so that that pipe was in use that long at least. It might have been a part of the previous year so far as the pipe was concerned.

Now, that was the pipe used when you take the concrete [fol. 276] after it is discharged, the yellow pipe shown on the print.

Q. 63. That is exit pipe No. 30?

A. That is exit pipe No. 30, that is a part of pipe No. 30.

Q. 64. And a part of Exhibit J?

A. Between the blower and the discharge in the form where we were using the concrete.

I call your attention to it to note that there was not one side of the pipe that was worn more than the other. I thought there was some question in some of the gentlemen's minds as to what I had testified to, and I wanted to show them that the pipe, that the material was in flight rather than sliding along in the pipe.

Q. 65. Was the pipe appreciably worn at all?

A. Well, it was worn some. It was worn bright, of course, but it has been in use so long that it would be absolutely necessary to show where.

Q. 66. How long had it been used, did you say?

A. Well, at least two years. It is at least two years, I think, since I bought any pipe. Now, we have an overplus of pipe that we are taking out of the hole, and that is the reason it is on the street.

Q. 67. What do you do with it when you bring it on the street?

A. We sell it. I think we get thirty cents a foot for it right now.

Q. 68. Is the pipe junk or used again as pipe?

A. It is used again.

Q. 69. For pipe?

A. Yes, I paid 56 cents for it when I bought it.

Q. 70. Now, yesteday after you got your blower in operation, did you blow concrete into a form such as that shown in figure 4 of Exhibit K or not?

A. No, we did not blow it into a form.

[fol. 277] Q. 71. What did you blow it into yesterday?

A. Well, the point that we were placing the concrete was on the north side of the tunnel along the bank. The bank is on the north side of the street. and our pipe, our discharge pipe comes up out of the south side. In order to run the pipe over and discharge in the forms I would have to shut off the street traffic, and the cop on the corner will not let us do that, so we had to discharge it in a box on the south side of the street and load it in the wheel barrows or buggies and run it across the street.

Under ordinary circumstances, we would run the discharge pipe over to the form, and then it would run it just as shown on the print. The street traffic made it necessary to change there yesterday.

Q. 72. Well, the pipe the end of the exit pipe that you used yesterday had a cap on it?

A. Yes.

Q. 73. Like No. 50, did it not?

A. Yes, sir.

Q. 74. And the lower portion of the pipe was slotted like No. 51?

A. Yes, sir.

Q. 75. Of figure 4, was it not?

A. Yes, sir, that is a good picture.

Q. 76. Now, did you have any baffle plates or cover to prevent spattering?

A. We always do when we are out in the street where the traffic might be affected. They throw an old tin can or a piece of asphalt drum and slit the opening and slide it over the top to keep it from spattering on the public as they go past.

Q. 77. That is because the air pressure is so great coming out?

A. Yes, it would spatter surely.

[fol. 278] Q. 78. How did the concrete come out of exhibit pipe No. 30 yesterday into that box?

A. Well, as good an illustration as I could give you is that picture; it is about the same thing.

Q. 79. I hand you the photograph you refer to and ask you which one you mean (handing photograph to the witness).

A. That is it, your Honor.

The Court: That is the one you showed me yesterday.

Mr. Johnson: The witnesses refers to a photograph in Defendant's Exhibit N.

Q. 80. That is it came up like the liquid stream C that you marked in the photograph?

A. Yes.

Q. 81. Was any upper air pressure used in the blower yesterday while you were blowing?

A. Well, there is always some that would come up through the mass of concrete that is in the blower. It works up from the bottom. It was not discharged into the top at all.

Q. 82. What I mean now there was no air pressure from the air supply No. 55 into the top No. 56 of the blower, was there?

A. There was not.

Q. 83. That connection had been disconnected entirely last spring, I believe you stated?

A. Some time, I could not tell just when.

Q. 84. What pressure were you working with yesterday?

A. I think Joe told me it was 78. I asked him. 75 or 78.

Mr. Cox: Let the man who knows testify to that.

Q. 85. You were in there. You did not watch the gauge?

A. I did not. I asked the operator though what pressure he had.

[fol. 279] The Court: Is not that good enough?

The Witness: He told me 75 or 78, I am not sure.

The Court: Is not that good enough?

Mr. Cox: No, the pressure was 65 and dropped down to 45.

Mr. Johnson: I saw it 75 myself.

Mr. Cox: Yes, it went to 65 or 75 before it was turned on.

The Witness: Yes. What pressure I had was what he asked me.

Mr. Cox: He said 67 or 68.

The Witness: He asked me what pressure I had, and I understood that to mean what we had on the pressure.

Mr. Cox: 67 or 68 is what I understood him to say.

Mr. Johnson: I saw 75.

The Witness: Yes, I thought so. I asked him and he said 75 or 78, I am not sure which.

Q. 86. Is not that air blown up through the mass?

A. No doubt.

Q. 87. And would be indicated on the gauge No. 57?

A. No question.

Q. 88. That is simply the same as it operates back over above the mass in the chamber No. 31, is it not?

A. Yes, sir.

Q. 89. So that liquid concrete will flow out?

A. That liquid concrete would flow out whether there was any there or not, Mr. Johnson.

The Court: Did you have it on? I thought you did not have it on.

[fol. 280] Mr. Johnson: That is the very point I am trying to bring out, your Honor.

When the thing was set up originally, this connection ran all the way over.

The Court: I know, but you did not have it yesterday at the time.

Mr. Johnson: No, but the air bubbles up through that mass, and it is liquid just like water or slush.

The Court: That may be, but you had no pressure on it from the top.

Mr. Johnson: No, my question is probably not clear to your Honor. It is my own fault.

Mr. Cox: The witness says the pressure was established at the top by the air going up.

Mr. Johnson: It bubbles up in there. This vessel is closed. If something did not go up in there to fill up the space you would get a partial vacuum. That air just comes up and equalizes that partial vacuum.

Mr. Cox: And establishes equal pressure.

Q. 90. That pressure that works up through the liquid cement in chamber No. 31 does not serve to press the cement down into opening No. 58, does it?

Mr. Cox: I do not think this witness can testify to that. The pressure is there.

The Court: It is a matter of mechanics, I suppose. The effect of filling up that chamber would be to some extent to [fol. 281] reduce the pressure.

Mr. Johnson: It would be to hold it back, yes, sir; as the air boils up in there it kills the vacuum.

The Court: It kills the vacuum and also reduces the other pressure.

Mr. Johnson: No, because that mean pressure is here now. There will be an equalizing effect. It would equalize just like on an ejector.

Mr. Cox: The pressure is established in that at the beginning of the operation. That is the point I make.

Mr. Johnson: Oh, no.

The Court: Do not take this down.

(Discussion.)

Q. 91. Now, I just want to ask you about a sample of stone you used. These samples of stone that you employed in that blower.

A. Yes, that is a fair sample. We have a much smaller —a great majority of our stone is smaller than the larger ones.

Mr. Johnson: Is it necessary to put those in evidence?

The Court: I do not think so.

The Witness: A stone that will pass through an inch and a half screen.

Mr. Cox: Let it be noted on the record that they run from an inch to two inches.

The Witness: An inch stone passes through an inch and a half.

[fol. 282] Cross-examination.

By Mr. Cox:

X Q. 92. I believe you stated yesterday, Mr. Kennedy, that there was no wear on the pipes used for conveying the concrete, is that correct?

A. I did not get the question.

(X Q. 92 repeated.)

A. Oh, no, that is not correct. There certainly would have to be some wear.

X Q. 93. So your testimony is that there is some wear, that the pipes evidence some wear?

A. If I said there was no wear on the pipe, I did not mean it in that sense at all. Never. Certainly there is some wear.

X Q. 94. These pipes that you showed yesterday, were they pipes that had been used on different sections of the job at different times?

A. Right where we were there using them, Mr. Cox.

X Q. 95. Some of them had been disconnected?

A. Taken off and we were through with them.

X Q. 96. You were through with them. Some of them had been disconnected from one pipe line and put in another perhaps?

A. Several times.

X Q. 97. Now, you said that you had used these pipes from two to four years that you have there. About how many cubic yards have you placed with all the pipes?

Mr. Morgan: We object to that, your Honor.

Mr. Cox: It is to show how much use they had.

[fol. 283] The Court: Overruled. It is proper to explain it on cross examination. Go on.

A. That would be very difficult to tell, Mr. Cox. It would be anyway even to give you an approximate idea because we always have a mixer on the street that we use in different places around the top. It would be very hard for me to give you an idea of that because I could not tell you anyway.

X Q. 98. The wear upon the pipe depends on how much concrete has been shot through it, does it not?

A. I would say certainly.

X Q. 99. Now, I want you to give me some idea as to how much concrete you shot through all that pipe there.

A. It would be very hard for me to tell you that. I can not approximate it. Probably three thousand or four thousand yards. I could not tell you. You see, I would have to have some means of knowing the length of the tunnel, which I could get at the office, of course. The distance of the tunnel lining we have and multiply it by the concrete required in there. That could give it fairly well, but it would not be anywhere like what you are asking.

X Q. 100. Well then, you have shot as much as 157 yards a day there?

A. That is the biggest we ever did, yes.

X Q. 101. At that rate it would only take you at 157 yards a day about, say, 20 days in use?

A. That would be so if it was all ready. There are times we do not blow or use any concrete for probably a week.

X Q. 102. Then your estimate is at the rate of 157 yards a day that these machines have been used something like 20 days?

A. No, sir.

[fol. 284] X Q. 103. Well, then, you have only shot, according to your estimate, something like 3,000 yards?

A. 3,000 or 4,000 yards, I could not tell you that frankly. I would be glad to if I could. There are a certain number of yards in the whole job.

X Q. 104. That is how much? What would be the total yardage, about?

A. I think it is 6,000.

X Q. 105. The whole lining of the subway?

A. Yes, I think so.

X Q. 106. Can you not get any closer to it than that?

A. I could verify it for you in a minute. I think it is 66,000. I can tell you if you will let me call up.

X Q. 107. What did you say, 66,000?

A. I do not want to stand on that. I can not say.

X Q. 108. Your estimate is 66,000?

A. I will not estimate anything without calling up.

X Q. 109. Give us your best estimate. You are the man in charge of the job?

A. Yes, I am, and I am at a loss to tell you, frankly. I can call the office and get the figures just in a minute if you want them.

X Q. 110. Just give us your best estimate now and we will get the figures later if we need them.

A. I think it is 6,000. Really I think it is 6,000.

X Q. 111. 6,000?

A. Yes. I should very much like to call, because I am at a loss myself.

X Q. 112. That includes the floors and walls and the arch. How long is that subway?

A. It is 3600 feet.

X Q. 113. Just tell us how high and how wide it is.

A. Well, it is 13 feet, 2 inches, from the base of the rail to the inside lining of the arch; and it is about 17 feet, the tunnel was driven about 17 feet.

[fol. 285] X Q. 114. In width?

A. In height.

X Q. 115. In height. Now, the width.

A. The width, I think is 11 feet 2, or 3 inches. Inside driven about 13 feet.

X Q. 116. How thick is the concrete lining?

A. Well, we get paid for 18 inches running on the top. 15, I think it is, on the side.

X Q. 117. And the floor and bottom?

A. About 6 inches.

X Q. 118. Can you not figure up about how much that would be?

A. I can give you a very much faster and accurate amount by calling up.

X Q. 119. How much concrete would it take? Would it not be something over 40,000?

A. Possibly.

X Q. 120. You identified this article published, these articles published in the "Engineering News Record" and "The Compressed Air" magazines in answering interrogatories in this case, did you not?

A. I have not seen them, but I think they are the same. I was with the gentleman that wrote them, Mr. Smith.

X Q. 121. You gave him the material from which that was written?

A. Yes, we travelled through the subway, and I gave him everything.

X Q. 122. Do I understand you to say now that only a small part of the concrete was shot through these machines?

A. Oh, no, the greater part.

X Q. 123. The greater part?

A. Yes, indeed.

X Q. 124. More than half of it?

A. I think so, yes.

X Q. 125. Now, I want your best knowledge on the question of how long you used dry concrete there before you changed to wet.

A. Might I explain.

[fol. 286] X Q. 126. Yes, sure.

A. You know, when we started in, Mr. Cox, we had the blower set up about 300 feet from where we were discharging the concrete. The rise in the 300 feet is a little more than the height of the blower, possibly five feet, and the dry concrete that the engineers insisted on in the start plugged the pipes on me, so I could not do anything. I had to take them apart and clean them out. We hooked it up again and tried it again with the whole shift, but I do not think we were blowing dry concrete fifteen minutes until I wanted more water in it. We had some question with the engineers at the time about it, and they insisted it had to be drier than I wanted to blow it.

I was very anxious to use the blower and I knew we were going to have a great many difficult places where we could not blow through the straight line, as soon as I put 90 degree bends in it that would have to be put in the line. I told the engineers in charge there at the time, "if there was any question about the quality of the concrete that we put in because we have to make it liquid, why, we will have to take it out and I will not be able to use the blower because I could not blow it dry."

X Q. 127. Who was the engineer with whom you had this conversation?

A. Mr. Schmidts.

X Q. 128. What is his full name?

A. Mr. Mayer and Stephen Schmidts.

X Q. 129. Who is Mr. Mayer?

A. Mr. John H. Mayer.

X Q. 130. What is his position?

A. Division Engineer.

X Q. 131. Were they the engineers superintending the [fol. 287] job for the Transit Board?

A. Yes, they are still in charge.

X Q. 132. Well now, you have not told us how you started to use wet concrete. How long after?

A. The first day we blew it I used wet concrete, right direct the very first day.

X Q. 133. Did I understand you to say this day was shortly after Christmas, 1922?

A. Right.

X Q. 134. You shot wet concrete through it?

A. Yes.

X Q. 135. After you had tried dry?

A. That is what brought on the argument for using it at the time. They let me go and I understood right along I would have to take it out when they sent to Columbia University for tests, and so they had it tested, and the test showed up all right, and we never had to change it.

X Q. 136. Then you used the wet concrete right along?

A. Yes.

X Q. 137. As I understood you to say yesterday, that was about three months or so after that that you used wet concrete?

A. No, that I understood was in regard to that piece they talked about on the top.

Mr. Johnson: You are mistaken about that.

By Mr. Cox:

X Q. 138. They talked about three months or so after you started that you stopped using it?

Mr. Johnson: You are mistaken about that.

[fol. 288] By Mr. Cox:

X Q. 139. Then it was about three months or so after you stopped using the top air pipe, is that it?

A. I do not think it was that long. Joe was there first for sometime on there, and Mr. Fleck came in there.

X Q. 140. Well, it was approximately that time, two or three months, while Mr. Fleck was there operating it, and he used the top air pipe, did he not?

A. I think he did, but I would not be positive on that point.

X Q. 141. Now, what does your original specification call for, you have said it was a one, two, 3.85 mixture?

A. That is right.

X Q. 142. And how much water to the cubic yard or cubic foot?

A. The water was not specified so much as the mixture to be produced. They wanted it all about the consistency of porridge. It would stand up when you would throw it on the shovel. It would not slide off, and that would be very difficult for us.

X Q. 143. You have your specifications under which you have been working?

A. Yes.

X Q. 144. Can you let us see them?

A. Certainly.

X Q. 145. Have you got them here?

A. Oh, no, our specifications and contracts are all in one book, you know, and the bond and everything is in it, and that is safely put away.

X Q. 146. You will let us look at that, will you not?

A. Oh, yes, certainly.

X Q. 147. When you made this change to what you call wet, no change of the formula was agreed upon?

A. Why, there was not any change in the formula, only [fol. 289] that we would use a little more water.

X Q. 148. Did they not say how much?

A. No, they did not say how much, because they were not in favor of us using any more water.

X Q. 149. Well, was there not any correspondence or any writing of any kind between you and the Rapid Transit Commission or the engineers on that subject?

A. No, it was all done verbally, right on the job, in the hole.

X Q. 150. What is the correct title of the Board that has the supervision over this work?

A. The Board of Transportation.

X Q. 151. The Board of Transportation?

A. When we got the contract it was the old Transit Commission, the State of New York; and since then there has been a turn in politics, that changed the Board, and the Transit Commission now has charge of the traffic, while the Board of Transportation has charge of the construction of the subways and new lines.

X Q. 152. Who was the man on the Board who had supervision over these engineers that you have mentioned?

A. Well, they move up in steps, Mr. Cox, from the inspector to assistant engineer, and from assistant engineer to an assistant section engineer, and then section engineer, assistant division engineer, division engineer, and chief.

X Q. 153. On the job there between you and the Board who was the man?

A. Oh, yes, we never met the Board at all.

X Q. 154. One of these men you have mentioned was an inspector?

A. Oh, no, he was the section engineer in charge of the work in that section.

[fol. 290] X Q. 155. Now, you have mentioned Schmidts and Mayer.

A. Mayer was division engineer in charge of all the construction work in his division.

X Q. 156. Who was the inspector?

A. The inspector? We have had so many changes. Blessed if I can remember.

X Q. 157. Give us the name of the one who was on the job when you made this change in the concrete.

A. I think there were two or three of them on the different shifts, Mr. Cox. I can not remember who they were.

X Q. 158. Can you not give us the names of any of them?

A. I think I could find out for you. O'Brien was one of the. Eddy O'Brien, and Anderson. A fellow named Anderson was another. O'Brien has gone and Anderson is with an express company, I think. They are all gone.

X Q. 159. You will permit us to examine the records of, what is it, the Transportation Board?

A. The contract?

X Q. 160. The Transportation Board.

A. The Board of Transportation.

X Q. 161. The Board of Transportation, relating to the concrete work which you did on this job.

Mr. Johnson: You have no jurisdiction over that, I object to that.

By Mr. Cox:

X Q. 162. As far as you have anything to do with it you will agree to it.

[fol. 291] Mr. Johnson: You will have to ask the Board, it seems to me.

The Court: Overruled; answer.

A. I will bring it down for you, my contract.

X Q. 163. You will let us examine the records of the Board?

A. That is what you mean?

X Q. 164. You will tell the Board you have no objection, will you not?

A. I do not have to.

X Q. 165. You will do it?

A. I certainly will. I will bring you down the contract if you want it, if it is necessary.

X Q. 166. Who was the man, engineer or inspector, or man with whom you made this agreement about the change?

A. There was not any mention of an agreement about it, Mr. Cox, because they were very fixed in their opinion in favor of the dry concrete. I insisted that the concrete we were using was just as good as dry concrete, and they had no authority under our contract to say it was not until it would be tested. I put it in and agreed if it would not stand up I would have to take it out.

We waited then for the report of the test at Columbia, and when that came they permitted me to go right on, because the tests were better than the other.

X Q. 167. Your contract specified that there was to be a certain consistency in this concrete that was placed in the walls of that subway?

A. I do not think you will get much on that. I will bring it down.

X Q. 168. It had some description?

A. Oh, yes.

X Q. 169. Engineers are very careful to have the concrete specified, are they not?

A. Yes.

[fol. 292] X Q. 170. Dou you mean to say that these engineers or inspectors, without any writing or memorandum agreed to let you——

A. Try it out.

X Q. 171. To let you give them a wet concrete, wetter than what they wanted?

A. They would make me take it off. They would stop the job and hold up my bond. I had a million dollar bond on the job.

X Q. 172. They agreed to let you use wet concrete that was not in the original specification.

A. It was not needed in the original specification, as I understand it. I will bring you the specification.

X Q. 173. All right; I guess that is the best. You say that you agreed to take the concrete out if it was not satisfactory?

A. Yes, I would have to.

X Q. 174. With whom did you make that agreement?

A. With the engineer right in the field. I told Mr. Schmidts.

X Q. 175. Mr. Schmidts?

A. Yes.

X Q. 176. And who else?

A. I think I told Mr. Mayer at the time. I do not remember whether Mr. Mayer was there when I was talking to Mr. Schmidts or not.

X Q. 177. Do you know who had these tests made at Columbia?

A. That was a regular proceeding. They have done that right along.

X Q. 178. Who takes the samples?

A. The Board of Transportation engineers.

X Q. 179. Schmidts or Mayer?

A. No, they have a Testing Bureau. They send for it and the man comes there and he has a little form, and he comes down without you knowing it, like a bank examiner, and fills up these test forms and goes out with them.

[fol. 293] X Q. 180. Who was he?

A. Blessed if I know. I really do not think I would know the man. I do not know that I have seen him, although there have been tests made periodically, I think, as often as once a month.

X Q. 181. Yesterday when you started this machine the line plugged up, did it not?

A. It did, the first batch.

X Q. 182. It took about an hour and a half——

A. They had to take the pipe apart.

X Q. 183. And we stood around there about an hour and a half?

A. I was very sorry.

The Court: Get right down to earth.

Mr. Cox: This is something about the operation.

X Q. 184. Was that plug up any different from the plugs that you have described, when you first started in the end of 1922?

A. Plugging the pipe is plugging the pipe.

X Q. 185. A plug is a plug?

A. I will explain why that plug was, if you want it.

Mr. Johnson: Do that.

Mr. Cox: I will object to it, unless he shows he has knowledge.

The Witness: Yes, I know.

X Q. 186. This concrete as it comes out of the discharge pipe on your job, from this head or nozzle, or whatever it is? How does it look in the receptacle, or in the form, or in the box, or whatever it is deposited in?

A. It is like wet concrete, surely, stones, sand and cement. [fol. 294] X Q. 187. Is it quiet?

A. Oh, yes, a liquid mass.

X Q. 188. Just a liquid mass. Is there any bubbling or foaming in it?

A. Well, we have 4,600 feet of double tunnels built so far, Mr. Cox, and I do not think we have had two square feet of what you would call honeycomb. That is what you are getting to. Bubbles would make honeycomb, and we do not allow the air to get in the concrete where it is placed.

X Q. 189. When the concrete is discharged it is solid?

A. It is.

X Q. 190. It is solid?

A. Oh, yes, there is no question about it.

X Q. 191. It is not honeycombed?

A. No bubbles in it, none at all; it would be very dangerous to discharge it that way.

X Q. 192. I understand that you disconnected the pipe on this machine that we examined yesterday, last spring sometime?

A. I could not say just when, Mr. Cox. It did not make much difference, because the pipe was full of concrete.

X Q. 193. You disconnected it you say about in May, was it not, or in June?

A. On this particular machine?

X Q. 194. Yes. When you first substituted the present counsel, who were substituted for the former counsel, at that time?

A. No, I did not. I did not take it off of this machine at that time.

X Q. 195. When was that then?

A. The time when we took it off the other machines because our counsel was up there; I told our master mechanic to take the other ones off as well. We took that one off while they were there. I think they were right present and he went over and seen it was blocked up. There was no [fol. 295] possibility of any air going through. They neglected to take it off for some little time. Finally he took it off and it was cleaned up. Just what date, I could not tell you. It was of no consequence, so far as use was concerned, because the pipe was full of concrete.

X Q. 196. You were under contract to finish that job some long time ago, were you not, six months ago or so?

A. The 21st of April.

X Q. 197. The 21st of April, 1926?

A. Yes—no, the 29th. I think on the 29th of April.

X Q. 198. Was the concrete pretty well placed at that time?

A. Yes, sir, the majority of it was, yes.

X Q. 199. How much was left to be placed?

A. I could not tell you in yards.

X Q. 200. Can you not approximate it? Let us get some idea.

The Court: He said the majority of it. Why go beyond that?

A. That is the nearest I can get to it.

X Q. 201. It may have been nine-tenths, ninety per cent?

A. Those are details I can not memorize.

By the Court:

Q. 202. Was it most all of it?

A. The greater majority of it, yes; I think so, I could explain why we were not through if that is what you want.

[fol. 296] By Mr. Cox:

X Q. 203. No. In this operation that was made yesterday, how far down below the street level was the mixer?

A. The blower was about——

X Q. 204. I mean the placer, the gun or vessel?

A. About 55 feet below the street.

X Q. 205. About 55 feet below the street?

A. We had eight 90's in the line between the blower and the discharge.

X Q. 206. The eight ninety degree bends in the pipe?

A. And two forty-five's.

X Q. 207. And two forty-five's.

A. Yes.

X Q. 208. And then the pipe extended laterally to some extent from the gun up on its way up to the ground?

A. One joint.

X Q. 209. Do you know how much concrete was discharged in a batch?

A. Well, the actual figures are 2-1-2-385. That is one part cement, two parts sand——

X Q. 210. No; I mean what quantity of concrete was discharged. How many feet in a batch?

A. — in a batch?

X Q. 211. Yes. Yesterday. I am speaking of yesterday.

A. Well, the technical idea is about four feet, four or five feet, but I think we get a little more.

X Q. 212. You did not measure it then?

A. No. We measure the boxes, yes. There are three and eight-tenths cubic feet of stone placed in the mixer.

X Q. 213. You did not measure it yesterday; that is what I am bringing out?

A. Yes.

X Q. 214. How did you measure it?

A. There is a box up on top and the sand is drawn out, [fol. 297] just fills that, and that is the requirement for that box, and a little larger box for the stone.

X Q. 215. You were downstairs and if men upstairs did not put in that quantity, you would not know?

A. No. Personally I did not do it.

X Q. 216. That is what I mean.

A. I do not do it any time, as a matter of fact.

X Q. 217. Just one or two other things I want to clear up: This stuff that was discharged yesterday on the street, that was dumped in behind a wall of the subway, was it not?

A. Yes.

X Q. 218. To fill in the space?

A. No. The protection wall on the outside of the water proofing.

X Q. 218. First comes the wall of the subway and then the water proofing and this outside, and that was dumped on that outside wall?

A. Yes.

Redirect examination.

By Mr. Johnson:

R. D. Q. 219. Mr. Kennedy, why was the exit pipe 30 plugged up yesterday when you went up there?

Mr. Cox: I object to that, unless he knows of his own knowledge.

Mr. Johnson: The best of his own knowledge.

The Court: Objection overruled; go on.

A. My best judgment in the matter is all I can give you.

Mr. Cox: I object to his best judgment.

The Court: Go on.

[fol. 298] A. (Continuing:) The man who used it previously did not wash the pipe out when he got through,

and the drip that goes from the top of the line down to 90, or wherever it was, had set up and hardened and would not allow it to go through. That is a most unusual thing. I was very sorry when we got there that we had to wait until they cleaned it out, but I know just what the trouble was and I thought it was fair to everybody.

Mr. Cox: I object to that and move to strike it out. He is not stating anything on his best knowledge. Just his best judgment.

The Court: I will overrule your objection. He does not know it, but it seems a reasonable supposition.

Mr. Cox: At the beginning of his operations in 1922?

The Court: Yes.

R. D. Q. 220. You spoke, Mr. Kennedy, about 90's and 45's; those are bends in the pipes, I take it?

A. Yes, sir.

R. D. Q. 221. What is the relative wear between the pipe 30 and the 90's and 45's you have in it?

A. Well, the ordinary 90 standard fittings would wear out in about from one to two eight-hour shifts; and I designed the 90 and the 45 that I showed you up there yesterday, a big heavy cast iron thing; we got about six months out of them. They wear out because the whole force of the charge strikes the bend as it goes around, while through the pipe there is a great deal of concrete that goes through the pipe that does not touch it at all.

[fol. 299] R. D. Q. 222. I am not talking about your new 90's; I am talking about the old 90's and old form of the same thickness as this pipe 30. How long would they last?

A. We have had some of them last a couple of days and some of them would wear out in one day.

R. D. Q. 223. And these pipes you had up on the street there, parts of exit pipe 30, had been in use some two years or so, you would say?

A. Yes, at least. More than that.

Recross-examination.

By Mr. Cox:

R. X Q. 224. When you are shooting your concrete in this machine through the conduit, and the machine is shut

down for the night for any considerable period, is it your practice to wash it out?

A. Always. Very few times in the last few years that I know of that it was not washed out, or there would be somebody looking for a new job. We take off the end, fill the tank full of water, turn the air on, blow it right through, and fill it up again; two times. Blow the water up on top, wash it out as clean as it is possible to wash it, take all the cement out. No matter what time of day or night, those are strict orders always.

R. X Q. 225. Was it the practice with the man who operated the machine?

A. Those are his orders, Mr. Cox.

R. X Q. 226. Who usually operates the machine?

A. Well, I have got, I guess there are three or four of the boys can run it in good shape.

R. X Q. 227. Who is your best operator?

A. We have him here.

[fol. 300] R. X Q. 228. What is his name?

A. Joe Swartz. He was the first one.

R. X Q. 229. And he is the best operator you have?

A. I think so, yes. I do not know there is very much between him and Louis, the Italian, although Louis does not understand just as well.

R. X Q. 230. He is the man who operated it last night, Joe Swartz, is he not?

A. Yes. But he was not the man who operated it previous to last night.

R. X Q. 231. So he is not looking for a job.

Mr. Johnson: Another job, you mean?

R. X Q. 232. You are very strict to have that regulation followed, are you, about washing out the pipe when the man gets through?

A. Try very hard, Mr. Cox. You could see how serious it is with the whole gang waiting if we had to do that every time. You would have to do it if you do not wash it out.

R. X Q. 225. Do you use any gravel when you wash it out?

A. Nothing more than might have been in the gun or in the tank. We do not put any in.

R. X Q. 226. Just shoot water through?

A. Yes. Fill the tank and blow it through.

R. X Q. 227. And if you do not do that, there is concrete in the pipe that will set and clog it?

A. There is no question about that.

R. X Q. 228. And if a man neglects that, you would probably discharge him?

A. If I caught him at it, yes.

[fol. 301] JOSEPH L. SWARTZ, called as a witness on behalf of the defendants, being duly sworn, testifies as follows:

Direct examination.

By Mr. Johnson:

Q. 1. Will you please give your name, age, residence and occupation?

A. Joseph L. Swartz, 203 West 103rd Street; age 48; concrete foreman for the Powers Kennedy Contracting Corporation, 42nd Street.

Q. 2. I show you Plaintiff's Exhibit No. 3, and ask if the man shown in that enlarged cut, the man on the right, is yourself?

A. Yes, sir.

Q. 3. I show you photographs which are in evidence as Defendants' Exhibits L and M, and ask you if they are photographs of the blower that you operate?

A. Yes, sir.

Q. 4. Now, I show you Defendants' Exhibit N, and ask if that is the end of the exit pipe extending from that blower that you operate?

A. Yes, sir.

Q. 5. How long have you operated this concrete blower?

A. Since about April, 1923.

Q. 6. Are you familiar with drawings, sir?

A. A little.

Q. 7. Do you recognize this drawing, Defendants' Exhibit J, and drawing, Defendants' Exhibit K?

A. Yes, sir.

Q. 8. And you know enough about drawings to say that those are the same as these photographs (handing to the witness)?

A. Yes, sir.

Q. 9. Now, did you ever operate the blower so that air pressure was let in the blower above the concrete?

A. Yes, sir.

[fol. 302] Q. 10. When?

A. A few days after I started to run the machine.

Q. 11. A few days; how long?

A. About two or three days.

Q. 12. And then you stopped?

A. Yes, sir.

Q. 13. Have you ever done it since?

A. No, sir.

Q. 14. Why did you stop?

A. Oh, the pipe used to plug up all the time, and I got orders not to use that top valve.

Q. 15. The top connection having the valve, 35, was left on the machine, or not?

A. Yes, it was left on.

Q. 16. Is this valve, 35, the upper valve, the valve that would be to connect the pipe running into the chamber above the concrete?

A. Yes, sir.

Q. 17. And the valve 36 is what?

A. The bottom, the bottom valve.

Q. 18. And that valve does what?

A. It shoots the concrete out through the bottom of the machine.

Q. 19. By what?

A. Air.

Q. 20. That is, valve 36 is the one that lets the pressure of the air down through pipe 33, is that right?

A. Yes, sir.

Q. 21. I again show you these photographs, and more particularly photograph Defendants' Exhibit M, and ask you if that upper connection is shown connected or disconnected?

A. That is shown disconnected.

Q. 22. Do you know when that was positively disconnected like it is shown in that photograph?

A. I think it was last April. April, 1926.

Q. 23. Have you operated the blower, Defendants' Exhibit J, and that shown in these photographs, Defendants' [fol. 303] Exhibit- L, M and N, since April?

A. Yes, sir.

Q. 24. Was there any difference in operation with the upper air pipe absolutely cut out, than the operation was prior to that time, before you stopped using this valve, 35? Do you understand the question?

A. No, sir.

Q. 25. Well, I will withdraw that question and reword it.

Mr. Cox: Why not ask him to explain it?

Q. 26. Will you please look at Defendants' Exhibit J, and the pipe that I now mark 60; that is not connected with the chamber, 31, in any way is it?

A. No, sir.

Q. 27. That is like the photograph that you have in your hand, Defendants' Exhibit M, is it not?

A. Yes, sir.

Q. 28. If I understand your testimony correctly, after the first two or three days, you never used the upper air connection pipe, 60, and the upper valve, 35, is that right?

A. No, sir.

Q. 29. Was there any difference in blowing the concrete after last April or May when the pipe 60 was actually disconnected and cut off, from the chamber 31?

A. There was not any difference.

Q. 30. It operated just the same way?

A. Yes, sir.

Q. 31. Yesterday you operated the blower, did you not, when these gentlemen were all there?

A. Yes, sir.

Q. 32. Did you operate just the same as you had for the last—what is it, three years or so?

[fol. 304] A. Three years, over three years; operated the same way.

Q. 33. Absolutely the same way?

A. Yes, sir.

Q. 34. What air pressure did you have yesterday, sir, on the main line, and how would you indicate that pressure?

A. The gauge there.

Q. 35. Which one, sir?

A. I do not know what number it is.

Q. 36. This one (indicating)?

A. Yes.

Q. 37. 61?

A. Yes.

Q. 38. And what pressure did you have on that gauge, yesterday?

A. Well, it went from 60 one time to 68 and then it went to 75. I think 75 was the highest we had.

Q. 39. Did you have any other gauge on the machine yesterday?

A. Yes, sir.

Q. 40. Can you indicate it here?

A. Yes, sir.

Q. 41. Where is it?

A. On top of the tank.

Q. 42. The gauge is marked 57?

A. Yes, sir.

Q. 43. That connects with the inside of the chamber 31?

A. Yes, sir.

Q. 44. Will you describe in your own way just how these gauges work with this pipe, 60, absolutely disconnected as yesterday? I do not want any theory. I want to know what pressures were registered on these.

A. On the main line, at one time it was 68, and again it would be 75 pounds.

Q. 45. That would be shown on gauge, 61?

A. Yes, sir.

Q. 46. And how about at the same time gauge 57?

A. That was zero.

Q. 47. Would it stay at zero?

A. Until you put the concrete in the tank and turned your air on.

[fol. 305] Q. 48. And turned the air on. Through valve, 36?

A. Yes, sir.

Q. 49. Then what happened to gauge, 57?

A. Well, as soon as the air was turned on in the valve to release the air, the gauge pressure—the gauge on top of the tank would register about 30 pounds when the concrete was going out.

Q. 50. When the concrete was going out?

A. Yes, sir. And the other gauge would drop down to about 40 or 45, and then as long as I kept the valve on, it dropped down to about 32 pounds.

Q. 51. When you first turned on the lower valve, 36, in the main air line, what was this gauge, 57, registering?

A. Zero, when you first turned it on.

Q. 52. And at that time this gauge, 61, was registering in the neighborhood of——

A. From 68 to 75.

Q. 53. One of the gentlemen yesterday, Mr. Kirkland, asked to take off your gauge, 57, and put one of his own on, did he not?

A. Yes, sir.

Q. 54. And he did that, did he not?

A. Yes, sir.

Q. 55. Did this new gauge register just as you testified a minute ago, as to the other one?

A. Yes, sir.

Q. 56. You know, Mr. Kennedy's orders are always to wash out this blower after you are through with it and before stopping the operation, do you not?

A. Yes, sir.

Q. 57. Do you always do that?

A. Always.

Q. 58. Was that the reason of the stoppage yesterday?

A. Yes, sir.

Mr. Cox: Wait a minute. I object to that. Mr. Kennedy said he was not on the job the night before.

[fol. 306] Mr. Johnson: I am talking of this witness here.

Mr. Cox: Mr. Kennedy said this witness was not on the job the night before.

Q. 59. You always wash it out, do you not?

A. Yes, sir.

Cross-examination.

By Mr. Cox:

X Q. 60. Mr. Swartz, I want to clear up this point: As shown on this drawing, Defendants' Exhibit J, the gauge, 57, at the top of the tank, registered zero, as I understood you, before the air was turned on to the machine.

A. Yes, sir.

X Q. 61. And then as soon as the air was turned onto the machine, it shot up to about, you say, 30 pounds?

A. 30 pounds.

X Q. 62. Your old gauge you had on there was in pretty bad condition, was it not?

A. Yes.

X Q. 63. The glass was broken and the face was all smeared with set concrete?

A. Yes.

X Q. 64. And you could not read the figures on it, could you?

A. No.

X Q. 65. Do you know just what the condition of the job was about the time you cut off this top pipe?

A. Oh, yes.

X Q. 66. I mean last spring, when you cut off the top pipe, cut it off altogether as you stated?

A. What the condition of the job was?

X Q. 67. Yes. Were you nearly finished there?

A. There was quite a lot of work to do. I do not know much about that. I just had the operating of the machine, that is all. I have no idea how much of the job was to be done, or anything.

[fol. 307] X Q. 68. Do you know whether the arches, the top arches of the tunnel were all in?

A. Oh, no.

X Q. 69. The tunnel was practically finished was it not, clear over to Broadway?

A. Well, pretty near. There were a lot of arches to do yet.

X Q. 70. The sides or the top you mean?

A. Walls of the arches.

X Q. 71. Quite a lot of that arch work remaining to be done?

A. Yes, sir.

X Q. 72. Do you know how much?

A. I have not the least idea how much.

X Q. 73. It is all finished now, is it not?

A. All the concrete is not finished, no.

X Q. 74. The arches?

A. The arches are all in.

X Q. 75. You had three of these machines there?

A. Yes, sir.

X Q. 76. That is, you operate all three of them at times?

A. No—at times I did, yes.

X Q. 77. Do you know whether the top pipe was disconnected on the other two, the other two than the one that you operated yesterday?

A. They were on the other ones, yes, besides the one I operated yesterday.

X Q. 78. They were all three of them disconnected?

A. Two of them that I know of. The other one was out of commission altogether for a long while.

X Q. 79. You do not know about that?

A. No.

X Q. 80. When you disconnect a pipe like this pipe leading to 57, it is very apt to become filled with concrete or grout, is it not? The soup as you call it?

A. Oh, yes.

X Q. 81. And this pipe that you had on the machine that was operated yesterday extended some little distance be-
[fol. 308] yond the gauge, did it not?

A. Yes, sir.

X Q. 82. And outside of the gauge it had on it a valve with a long handle?

A. Yes, sir.

X Q. 83. And then there was a spout on the extreme end, turning down?

A. Yes, sir.

X Q. 84. That was an old coupling that had been left on the pipe, was it not?

A. That was a coupling to blow the air down.

X Q. 85. In this photograph here, enlargement, Plaintiff's Exhibit No. 3, will you please tell me where your left hand is and what that is on—your right hand, first, I want to ask?

A. The right hand, the bottom valve.

X Q. 86. And what is the left on?

A. The left hand is resting on a pipe, the upper pipe, the pipe for the upper part of the machine.

X Q. 87. Is not that left hand on the valve handle there?

A. No, I do not think so. It is just resting there so I can throw my hand here and close the door. Just lean up against it.

X Q. 88. You are quite sure that your left hand is not on the valve handle that operates the upper valve?

A. I do not think so. I am just resting my elbow on the pipe there, that is all.

X Q. 89. When did you pose for this photograph?

A. I do not know exactly. I have not the least idea.

X Q. 90. Well, now, just give us the approximate date. It is of some consequence.

A. Maybe a year or two ago. I could not exactly tell, because I did not even know it was coming out in the papers when I posed for it.

X Q. 91. Was it as much as two years ago?

A. Perhaps two years.

[fol. 309] X Q. 92. Not more than that?

A. I do not think so.

X Q. 93. Now, Mr. Swartz, are you interested in the Powers & Kennedy Company?

A. No, sir.

X Q. 94. Are you related to Powers or Kennedy?

A. My brother-in-law, that is all.

X Q. 95. Who is that?

A. Mr. Kennedy.

X Q. 96. Mr. Kennedy is your brother-in-law?

A. Yes.

Redirect examination.

By Mr. Johnson:

R. D. Q. 97. Mr. Swartz, you were asked about a relief valve that was on a machine up there yesterday; what is the purpose of that relief valve?

A. In case of a plug in the pipe, to release the air.

R. D. Q. 98. And in that particular machine yesterday it was on an extension of pipe, which I will designate 65, was it? Was that where it was?

A. Right off the gauge.

R. D. Q. 99. Up here (indicating)?

A. Running straight out from the gauge. That is it.

R. D. Q. 100. Right out here (indicating)?

A. Yes, sir.

R. D. Q. 101. I will dot a line there and we will call that—I am not much of a draftsman, but there was a relief valve at 65, right there, was there?

A. Yes, sir.

[fol. 310] FRANK L. DYER, called as a witness on behalf of the defendant, being first duly sworn, testifies as follows:

The Court: You need not bother about Mr. Dyer's qualifications. I think we can admit he is qualified. He is here in court all the time. I want to get through this testimony and find out any scientific matters to which he will testify.

Mr. Cox: I will admit his qualifications prima facie. I may want to ask him one or two questions, that is all.

Direct examination.

By Mr. Morgan:

Q. 1. State your name, age, residence, and occupation?

A. Frank L. Dyers; age, 56; residence, Montclair, New Jersey. I devote myself entirely to work as a patent expert.

Q. 2. Have you read the patent in suit and the testimony in the prior suit against the Ulen Contracting Company, and the decision of the presiding judge, Judge Hand, in this suit?

A. I have.

Q. 3. Please explain to the Court the substance of the original disclosure; please explain to the Court the substance of the original disclosure of the patent in suit as filed in the Patent Office, and then go on and say anything further about it that you have in mind.

A. As the application was originally filed, it related to apparatus for handling——

[fol. 311] The Court: I do not see how Mr. Dyer can be allowed to argue here about the file wrapper and everything else. That is not what we have experts here for.

Mr. Morgan: It is a rather complicated record.

The Court: You will have to argue that yourself. I am not going to take a record of that.

Q. 4. Mr. Dyer, please take up the patent in suit and explain its structure and manner of operation, as you understand it.

A. As I understand the invention of the patent in suit, the method involves the conveying of concrete by compressed air by detaching slugs or sub-masses of concrete from a mass in a closed chamber, and forcing these masses or slugs through the pipe to the place of delivery by pressure as distinguished from kinetic energy. That is the method and apparatus described in the patent and as already explained by Mr. Ray. The function of the lower air as disclosed in the patent is to break off the sub-masses of the concrete from the main mass within the receptacle and to force those sub-masses through the pipe by pressure.

By the Court:

Q. 5. You mean that pipe there (indicating)?

A. As shown in the patent; the lower air enters through the pipe 10 and opens just about the neck of the vessel. My understanding of the invention is that that lower air [fol. 312] breaks off successive masses of the concrete and forces them by pressure through the pipe.

The essential characteristics of the McMichael invention, as I understand it, is to preserve intact and undisturbed the complete mixture of the concrete batches in its travel from the compressed air device to the end of the conveying pipe.

By Mr. Morgan:

Q. 6. Do I understand from you that it is the function in this device of the pipe 8 to press the concrete downward?

A. The static pressure applied to the top of the mass by means of the pipe 8 forces the mass downwards so as to pass the mouth of the pipe of the lower air, permitting the lower air to detach the masses or slugs of concrete, as I have explained. The pipe 8 is a necessary feature of the apparatus and method.

By the Court:

Q. 7. Pipe 8 is the upper air?
A. Upper air.

The Court: Is that in all the claims here?
Mr. Cox: It is not in any of them, your Honor.
Mr. Morgan: I think it is in all of them, your Honor.
Mr. Johnson: Most of them.
Mr. Cox: That pipe is not mentioned. It simply says, means for admitting air to the upper part of the chamber. [fol. 313] Mr. Morgan: That contention is included in all of the claims; that is one of our contentions in this case.

By Mr. Morgan:

Q. 8. Mr. Dyer, will you please consider the patent in suit as it was explained by Mr. Kirkland and Mr. Ray in the preceding suit, and as construed by the present Court in the Ulen suit, and state your views on those different questions, if you differ from them?

Mr. Cox: May I add, there are several claims here in suit, claims to the apparatus, which do not mention any air at the top.
Mr. Morgan: That is a matter of difference of opinion of Counsel. I think it is a matter of argument.
Would you like to have the record here to refresh your memory, Mr. Dyer?
The Witness: I do not know as I quite understand your question.

(Q. 8 repeated.)

The Witness: I still do not get it. What question do you want me to consider?
The Court: I am not going to have any expert in this case, unless you can ask him some scientific question that is concrete. I am tired of this long diffusion. I am not going to change our rule and have an expert talking large about another lawsuit.
Mr. Morgan: Your Honor, I will take up the new patents [fol. 314] in the prior art, and have him explain them to the Court, and drop this other line entirely.

Q. 9. Will you please take up the prior patents set up in the answer, and explain them to the Court in relation to the issues of the present case?

A. I call your Honor's attention, first, to two patents to Smith, No. 122,497 and 122,498. The first patent relates to a very liquid concrete mixture designed to be used in manufacturing pavements, buildings, and so forth.

The second patent relates to apparatus for placing such a liquid mixture. I call your attention to figures 3 and 4. By figure 3 is shown a chamber in which the concrete materials are placed, and by means of a revolving fan or wheel, these ingredients are evidently mixed so as to form a liquid or easily and readily flowable material. From that mixing device the concrete flows into a chamber marked F in figure 4, and by means of compressed air admitted to that chamber, the liquid concrete mixture is forced out by pressure therein by kinetic effect through D in figure 1, so as to be deposited at the desired locality.

By the Court:

Q. 10. Is that it there (indicating)?

A. Yes, sir. It shows a very liquid mass, only the upper air pressure forcing the liquid there out through the pipe. I call your Honor's attention now to Patent to Beach, No. 267,318. In this patent an apparatus is shown for trans-
[fol. 315] porting the materials similar to grain. There is a closed chamber. Rather, there are two chambers, but they are operated alternately. In E the grain or other materials similar to grain, is placed and by means of pipe, air is admitted from an air reservoir, so as to apply pressure on top of the grain or material; that forces the grain down past the valve R into a conveying pipe H, and by means of the kinetic energy of the air rather than pressure the material is floated through that pipe to the place of deposit.

Beach is very similar indeed to the operation of the defendants' device here.

The next patent, which was not before your Honor before, is patent to Davidson, No. 599,055, where a very similar apparatus is shown for transporting tobacco leaves, tea leaves, wood chips, and so forth. Those are deposited in a hopper

shown at Fig. 6, and by means of a fan, A, shown in Fig. 1, the material is floated up by kinetic energy to the place of deposit.

Another patent which was not before your Honor, showing the state of the art, is Canniff, No. 873,345, shown particularly on sheet 1. This is a patent for handling grout, which is the very liquid mixture of cement and sand and water. The grout is placed in a container there shown in Fig. 2; the compressed air is then conducted by means of a pipe, B, and that compressed air flows down through pipe, B^1, into the chamber so as to agitate the mass and thoroughly mix it. After which the valve, B^1, is reversed so that air pressure then enters the top of the chamber to blow out the liquid grout mixture through a discharge pipe to the place of deposit.

[fol. 316] The final patent to which I refer, has been already treated, McIlvrid, No. 958,421, also showing a grout machine, where the grout mixture is placed in a closed container in which paddle wheels are located, so as to thoroughly mix it, after which compressed air enters the top of the container, so as to flow the mixture through a discharge pipe to the place of deposit.

(Adjourned to October 13th; at 10:30 A. M.)

JOHN KENNEDY recalled.

Direct examination.

By Mr. Johnson:

Q. 229. Mr. Kennedy, I want to clear up your testimony, any ambiguity that is in it. I call your attention to page 293 of the record:

"X Q. 189. When the concrete is discharged it is solid?
A. It is.
X Q. 190. It is solid?
A. Oh, yes, there is no question about it.
X Q. 191. It is not honeycombed?
A. No bubbles in it, none at all; it would be very dangerous to discharge it that way."

What have you to say as to that testimony? Is that correct or not?

A. It is ambiguous.

[fol. 317] Q. 230. Just tell the facts.

A. The concrete as discharged from the pipe is in a liquid condition. When it goes into the form, it is in a liquid condition. It solidifies in the form.

FRANK L. DYER resumed.

Direct examination.

By Mr. Morgan (continued):

Mr. Morgan: I have here, your Honor, an enlarged photographic copy of the drawing of the Smith Patent 122,498, which patent is in evidence, and I would like to introduce this merely for the convenience of the Court.

The Court: All right.

(Marked Defendants' Exhibit O.)

Q. 11. Mr. Dyer, in this Smith Patent No. 122,498, please state what means, if any, are shown for closing off the mixer from the concrete blower during the blowing of the concrete?

A. The gate value, Your Honor, is shown in the duct *d*, to prevent the air pressure from blowing the concrete back from the blower.

Q. 12. I suggest that you mark that with, say, the letter G for identification.

A. I have done so.

Q. 13. Mr. Dyer, have you examined the defendants' device and seen it in operation?

A. Yes. I saw the defendants' device in operation in [fol. 318] April of this year at the Forty-second Street subway. At that time it was discharging through a horizontal length of about 400 feet with one rise of about ten or fifteen feet to the point of discharge.

Q. 14. I hand you herewith Defendants' Exhibits L, M and N, being photographs of Defendants' device, and ask if you were present when those photographs were taken.

A. Yes, I was.

Q. 15. Please state whether or not at that time the top air pipe was disconnected.

A. It was.

Q. 16. Will you please explain to the Court the structure and manner of operation of defendants' device, referring as you may see fit to Defendants' Exhibit J and K.

A. The defendants' device comprises a blower of the general hopper shape shown, a door being provided in the upper part through which the very liquid concrete mixture is introduced into the blower, after which the door is closed so as to seal the interior of the blower.

Leading into the lower end of the blower is a discharge pipe as shown in yellow in the exhibit before your Honor and marked 30. The pipe leads to the place of discharge and through it the very wet concrete is directed to the desired forms or molds.

Entering the pipe 30 below the blower is a pipe supplying air. This pipe leads from a suitable air tank or reservoir not shown in this drawing, and at the time the apparatus was operated under the conditions I observed then, the air pressure was about 60 pounds. Of course, the pressure will [fol. 319] have to be increased if the discharge has to be forced through a large number of bends or through a vertical extension, as I understand is now being done in the particular work with which the blower is used.

By means of a valve marked 36, air can be introduced through the air pipe 33 and will pass through the discharge pipe 30. If we discharge the concrete in the blower, and consider this air passing through that pipe, we will find that the energy of the air is both static and kinetic. The air has a certain static pressure which gradually drops as it progresses through the pipe, being at the maximum in the neighborhood of the blower and the minimum at the discharge orifice, and its velocity depends upon a number of factors, including the initial pressure, the diameter of the pipe, the length of the pipe and so forth.

In addition to the static pressure of the air, it also has a small added pressure called pressure of impact. If, for example, I should place a tube at right angles at the pipe 30, as I indicate with my pencil, and connect a gauge at the upper end of that tube, a certain pressure will be indicated at different points along the pipe, and that pressure will be the static pressure.

If, however, I take the same tube and bring it down inside the pipe and put a right angled bend at the lower end of the tube facing the direction of the flow, the pressure will be slightly greater because that tube known as a pitot tube will indicate both the static pressure as well as the kinetic pressure or impact pressure.

The kinetic energy of the air operates cumulatively. In other words, with a steam turbine, we have very large rotors [fol. 320] that may weigh 100 tons, and we direct against that rotor a jet of steam. The only energy we have in that steam is the kinetic energy of that impact. It is very small measured in pressure, but it is operating all the time, and the cumulative effect is to drive the rotor and in that way secure power.

When we introduce the liquid concrete, and the concrete that I saw was very liquid, about like pea soup, in the blower and turn on the air, this column of air begins to travel through the pipe and the static pressure of that air causes a certain pressure to be established above the concrete mass.

In other words, the air bubbles up through the mass and breaks the vacuum above the concrete mass in the blower. That air pressure above the mass necessarily is always lower than the pressure below, because in addition to the weight of the concrete opposing the air as it flows out, we have the resistance to the passage of the air by reason of the material itself. So that the pressure above is always considerably less than the pressure below.

That, however, allows the liquid concrete to flow out through the blower where it is caught by this traveling current of air and carried along the pipe in suspension.

I observed at the time that I saw the apparatus, that whenever the air was turned on, there was a tremendous noise like the inside of a boiler factory by reason of the fact that the stones in the concrete mass are being bumped along the pipe; they rattle along the pipe. If the mass came [fol. 321] out in a gob or a sub-mass, that noise would not be heard.

The discharge as I saw it was directed horizontally and the concrete was being discharged into forms, as shown in figure 4, Exhibit K, the impact of the material striking the end of the pipe and the material then dropping by gravity into the forms.

I observed that when the discharge was first made, we got nothing but air, and then following was a discharge of sand and cement, light stuff, light soup-like stuff, and then after that, the stones came along, because, being heavier, they naturally had more inertia and held back and that very wet concrete then simply dropped in the molds and would set.

That operation is not, to my mind, the same as the operation of the patent in suit because we did not have a compressor above the mass, because necessarily any pressure above the mass is less than the pressure below there, because the origin of the pressure above the mass is form below. Nor did we have the breaking off of the concrete mass into sub-masses or slugs, but we had the concrete carried through in a steady stream by the kinetic energy.

The operation as I saw it was very much slower than I understand to be the operation testified to in the Ulen case. As I remember it, the testimony showed that the McMichael blower discharged in five or ten seconds. The discharge in the defendants' device was about 50 seconds.

[fol. 322] By the Court:

Q. 17. All you want in the way of pressure above in any kind of device, whether it is the plaintiff's or defendants' here, is enough pressure to empty the receptacle, is it not?

A. With the McMichael patent, the patent says that the material is impervious to air. Therefore, you could not introduce air at the bottom and you must have pressure at the top sufficiently great to actually force the material out. It flows out by gravity.

Q. 18. Supposing there was no pressure at all?

A. Where, your Honor?

Q. 19. Would it be possible to have no pressure at all? Would the material flow down without any air bubbles going up?

A. If you have air below and if you have a liquid material, the air will go out. If you do not have air pressure below and have a liquid material, it will flow.

I might say that when I was with Edison out at the Edison laboratory, he was working on his so-called cement house, and that house was a poured house. He used very little cement or very little concrete, but he did not use a

thing of this kind. He simply used chutes. But he poured that concrete down in vertical forms, and then it would flow over into horizontal forms to form the floors.

If that is what your Honor has asked me, liquid concrete would flow.

Q. 20. I was asking you whether if you had a thick material, if it was not as liquid, if it was pretty thin, but thick [fol. 323] enough to flow under pressure, at any rate, from above, would it flow if that pressure was withdrawn?

A. I doubt it because there always would be a tendency, if the concrete is thick, to bridge across the lower end of the hopper, and as a matter of fact, with the McMichael patent, as your Honor may remember, the lower air jet is placed at that point.

Q. 21. The pressure above we call simply a booster, do we?

A. No, we call the thing a booster. The McMichael idea is to force the concrete out by means of the upper air pressure and the lower air pressure was simply the booster or auxiliary supply.

Mr. Cox: We have here the drawing identified by this witness Fleck who built the machine introduced as Plaintiff's Exhibit 5. There is some deviation between that exhibit and this Exhibit J.

Mr. Morgan: I will say that I sent my draftsman up there unaccompanied by me and told him to make this drawing showing exactly the machine which was in place. If Mr. Cox is going to make an evidential point of this, I will have to send for my draftsman and put him on the stand and have him testify as to that.

Mr. Cox: If there is any difference between this authentic drawing that has been identified by Mr. Fleck and that drawing, I simply want to note it.

The Court: Go on.

[fol. 324] By Mr. Morgan:

Q. 21. Mr. Dyer, will you please state whether or not the liquid concrete is carried through the discharge pipe kinetically or by the flotation method?

A. It is, as I tried to explain it, nothing but static pressure.

Mr. Cox: If there is any difference, this drawing identified by the defendant Fleck must control. The proportions, I think, are different.

Mr. Morgan: I ask permission, therefore, your Honor, in view of opposing counsel's raising this question to put my draftsman on.

The Court: Is he here?

Mr. Morgan: He is down at my office.

Mr. Cox: He can not contradict his own defendant.

The Court: Do these things make any difference?

Mr. Cox: I do not know; they may or they may not.

The Court: If I were in your place, before I raised the point, I think I would know whether it was of any avail.

Mr. Cox: I have not had a chance to talk to my expert on this matter. I think there is some difference because the proportion of this discharge pipe to the discharge orifice at the bottom of the vessel and the air inlet is different.

The Court: Go on.

[fol. 325] Cross-examination.

By Mr. Cox:

X Q. 22. Mr. Dyer, these photographs, L, M and N in evidence, were flash lights, were they not?

A. Yes.

X Q. 23. Do you know what exposure was employed? *A.* The shutter of the camera was opened and the flash light then set off, I suppose?

A. Yes.

X Q. 24. You did not see the operation of the defendants' apparatus on October 7th at Forty-first Street and Broadw-y?

A. I did not.

X Q. 25. You have stated this morning that there was a certain velocity of air in the outlet marked 58 of the drawing, Exhibit J. Did you ascertain what that velocity was?

A. I did not.

X Q. 26. Were you able in any way to judge the velocity?

A. No, except that it was sufficient to carry the material out.

X Q. 27. You have called the defendants' apparatus a blower. Do you know what pressures are ordinarily employed in blowers?

Mr. Morgan: I object, your Honor. What kind of blowers? What kind of pressures?

The Court: I will allow the question.

A. Some blowers using fans may have a pressure of only a fraction of an ounce to several ounces. Blowers of the Root type give substantial pressures that can be measured in pounds.

I did not use the word "blower" as having any significance at all. You might call it a gun. I think it is called a gun, practically.

[fol. 326] X Q. 27. Did you employ any means to ascertain the pressure in the outlet pipe 58 and 30?

A. No, except that that pressure was necessarily higher than the pressure indicated on the gauge at the top of the blower.

X Q. 28. Then you think that the pressure in the discharge pipe marked variously 30 and 58, is greater than the pressure at the top of the vessel?

A. Yes, necessarily so.

X Q. 29. You did not ascertain that by means of any instrument?

A. No, except that the origin of the pressure is below and therefore it must be less than above. I have, however, in other arts dealing with somewhat the same situation made measurements that convinced me of the correctness of my statement.

X Q. 30. Did you form any opinion as to how great the difference is between the bottom and the top of the vessel, the discharge outlet and the top?

A. Simply as a matter of opinion, I have.

X Q. 31. You have not measured it in any way?

A. No.

X Q. 32. You stated that if the concrete were being discharged in slugs, the noise that you observed in the pipe would not occur. Why do you say that?

A. Because as I understand the invention, as it was explained by Mr. Ray, there are sub-masses of the material forced through the pipe in their original conditions of mix, just like the section of a small piece of putty that we used to put in pea-shooters as boys and blow through the pressure. That slug would, therefore, be in the nature of a [fol. 327] plug. It would be going through the pipe like

the receptacle of a pneumatic piston that is forced below by the static pressure through the pipe, and being a soft more or less duplicated material, I should not expect that there would be much noise.

But the noise I heard was like gravel on a tin roof being blown by a heavy storm, except to a very exaggerated extent. It was a very simple noise if you could visualize these rocks or stones rattling through the pipe.

X Q. 33. Concrete being composed of rock or gravel mixed in with soft wet material, can you not conceive that there would be internal agitation in each batch or each slug?

A. Not if the device worked with static pressure, as I understand to be the case, that is, the McMichael, of course.

X Q. 34. What caused the noises that you heard? Was not that caused by the lateral movement of the stones?

A. Yes, they were rattling along, they were being carried along by the air just like a dust storm on the street, and they rattled back and forth.

X Q. 35. There was lateral movement of the stone as it passed through the pipe?

A. Yes.

X Q. 36. That is to say, across the pipe?

A. Yes.

By the Court:

Q. 37. Why would that occur ~~any~~ more if the stones were being carried along like dust, as you said, or sand, than if it was being forced through?

A. If you force a mass through, a mass of cement with [fol. 328] sand and stone all glob together like a plug and force something through, which I understand to be what McMichael claims, and that thing goes through as a unit, the mass would not change its composition. It would go through like the piston of a gas engine.

Q. 38. I should think it might make a great deal of noise of rattling or scraping.

A. Not through the pipe.

Q. 39. With these rough edges of gravel an inch and a half in diameter, I do not see why not.

A. Of course, rough edges of stone would make a scratching noise, but not the rattling noise that I observed in the pipe.

By Mr. Cox:

X Q. 40. Can you not conceive of those slugs being in rotation as they move along and turning over internally?

A. Not if you work it with pressure.

X Q. 41. Did you not hear the testimony of Mr. Kirkland in which he said that there was internal mixing of the slugs as they went along?

A. I did not. Did Mr. Kirkland testify in this case?

X Q. 42. Yes.

A. I do not think I heard him.

Mr. Morgan: He did not testify in this case.

Mr. Cox: Yes, he testified for the defendant relating to an operation described by him.

[fol. 329] By Mr. Cox:

X Q. 43. I just want to consider a few things: You know the weight of a cubic foot of concrete, do you not?

A. Not offhand, no.

X Q. 44. About what is it?

A. I have not any idea. I would not like to guess. The books tell you.

X Q. 45. What is your idea? I want to know that as affecting your testimony as to its operation?

A. I would not like to guess, Mr. Cox.

X Q. 46. You have not any definite opinion as to its weight?

A. No; several hundred pounds, I should say.

X Q. 47. Can you tell us the relative weight of air and stone, say granite or limestone or flint?

A. No; the books will tell you that.

X Q. 48. Can you give us the relative weight of air and water, which is the basic unit in determining the specific gravity of solids?

A. Water, of course, is one, air must be .1 or less—I do not carry those figures in my head.

X Q. 49. So air would be 1/10?

A. One-one-hundredth; .01.

X Q. 50. As a matter of fact, do you not remember learning somewhere that the weight of air is about one-eight-hundreth of the weight of water?

A. That may very well be.

X Q. 51. So that water is eight hundred times heavier than air and ordinary rock is from two and a half to three times heavier than water?

A. I accept those statements.

X Q. 52. So that rock is from 2,400 to 3,000 times as heavy as air?

[fol. 330] A. That may very well be.

X Q. 53. And after considering these weights, you are still of the opinion that the air in defendants' apparatus can pick up and float to distances of 1,100 feet or more and to elevations up to 67 feet, rock which is 2,400 to 3,000 times heavier?

A. Absolutely.

X Q. 54. That is your opinion?

A. Yes.

X Q. 55. Are you familiar with the operation of what is commonly known as an air lift?

A. Water lift?

X Q. 56. An air lift for water?

A. Yes. I know generally, Mr. Cox. I would not care to go into the details of that. I know what an air lift is. It raises water from deep wells by means of air pressure travelling up through the pipe.

X Q. 57. Do you know how the water comes up to the top of the pipe when that air lift is operating?

A. I do not recall that, no. Of course, Mr. Cox, I have tried to emphasize that the reason air is effective is because it is cumulative.

X Q. 58. I understand your direct testimony. Mr. Dyer, you are not an engineer, are you?

A. No, though I spent ten years of my life in the Edison Laboratories.

X Q. 59. Have you had any experience in the actual operation of apparatus employing fluids under pressure?

A. I made experiments with apparatus of that kind.

X Q. 60. I mean in the actual operation of the apparatus?

A. I have actually operated apparatus involving moving fluids under pressure.

[fol. 331] X Q. 61. Just state briefly what that was.

A. One was a case of so-called automobile torpedo. A test was made of the gases for operating the turbines in the torpedo. The other was a case in this district involving

acetylene lamps where the gas had to pass through a sludge-like material somewhat with the consistency of concrete.

X Q. 62. The air passed through calcium carbide, forming acetylene gas?

A. The gas as developed had to pass through calcium carbide.

Mr. Morgan: I have the draftsman here, your Honor.

The Court: Put him on.

HAROLD I. HARTSHORNE, called as a witness on behalf of the defendants, being first duly sworn, testifies as follows:

Direct examination.

By Mr. Morgan:

Q. 1. Please state your name, age, residence and occupation?

A. Harold I. Hartshorne; thirty years old; Murray Hill, New Jersey; draftsman.

Q. 2. Can you tell me who made this drawing, Defendants' Exhibit J, which is before you?

A. I did.

Q. 3. Will you please state briefly how you made that drawing what measurements and observations you made and what sources you used?

A. I first went up and looked at the machine and after I [fol. 332] returned I was given a blueprint which Mr. Morgan holds (Plaintiff's Exhibit No. 4). I think I was given the blueprint first and took it up with me and looked at the machine, checked it up, came back to the office and laid my drawing out in proportion to the blueprint, with corrections as noted on the actual machine.

Cross-examination.

By Mr. Cox:

X Q. 4. Mr. Hartshorne, when you measured this machine shown in drawing, Exhibit J, was the machine in operation?

A. No.

X Q. 5. Was it hooked up ready for operation?

A. It was hooked up ready for operation.

X Q. 6. And the bottom outlet which is marked 58 on your drawing was connected with the tank; is that right?

A. Yes, it was.

X Q. 7. And the pipe marked 33 was connected with the bottom outlet?

A. Yes.

X Q. 8. And you have identified this drawing—this is the drawing you identified (Referring to Exhibit 4)?

A. Yes.

X Q. 9. Is that the only drawing that you had to guide you?

A. Yes, to my memory.

X Q. 10. Did you make any measurements of the machine up there?

A. Only by eye.

X Q. 11. You did not make any actual measurements with any instrument?

A. No.

X Q. 12. You did not have, then, Exhibit 5 which I now show you?

A. I cannot state definitely on that.

Mr. Morgan: We rest.

[fol. 333] REBUTTAL PROOFS (CONTINUED)

FREDERICK RAY, called as a witness in behalf of the plaintiff in rebuttal, being duly sworn, testifies as follows:

Direct examination.

By Mr. Cox:

Mr. Cox: I suppose Mr. Ray's qualifications will be admitted?

Mr. Morgan: They are admitted.

Q. 1. I will just ask you Mr. Ray to state what actual practical experience you have had in the construction and operation of apparatus operating with fluids under pressure.

A. I have spent a large part of my engineering work along those lines in connection with pumping machinery,

air machinery of various kinds as well as with steam turbines and such things. Most of my work has been in connection with the handling of liquids and gases.

Q. 2. Have you examined different apparatus for discharging and conveying and placing concrete pneumatically?

A. Yes, I have, several.

Q. 3. Did you witness the operation and study the construction and operation of the defendants' apparatus at 41st Street and Broadway, Queensborough Subway extension, on October 7th?

A. I did.

Q. 4. I am referring to the machine as operated by Mr. Swartz in the presence of Mr. Kennedy and a number of witnesses?

A. Yes, I was there.

[fol. 334] Q. 5. You have also heard the testimony of the defendant's witnesses concerning the construction and operation of that apparatus and have examined the exhibits which have been introduced in evidence, have you?

A. I have.

Q. 6. Please explain the construction and operation of defendants' machine as shown by the exhibits and as observed by you at the exhibition of the machine in operation on October 7th at the Queensborough Subway extension, 41st Street and Broadway, and state whether you agree with the description of defendants' witnesses?

A. I will first refer to that enlarged drawing, Plaintiff's Exhibit 3, which is a reproduction of the Engineering article describing the defendants' apparatus as originally installed, and as shown in this photograph, the apparatus consists of a receiver B containing the charge of concrete which is conducted into the receiver through the chute H above and into a hopper going then through a valve located at A and finally into the receiver itself.

After the charge is placed in the receiver, the valve located near A is closed by means of a pneumatic cylinder, and air may be admitted first to the bottom of the discharge pipe at A by manipulating the throttle valve K, and then air may be admitted to the top of the receiver by manipulating the throttle valve M, or this mode of procedure may be reversed, admitting the air to the top of the

receiver first and then immediately to the discharge pipe E afterwards.

If this mode of operation, either one of them which I have outlined, is carried on, then the apparatus, in my opin-
[fol. 335] ion, will operate exactly the same as the device of the McMichael patent in suit; that is, the concrete will be discharged through the discharge pipe in the form of slugs or pistons of various sizes, with a slug or a certain amount of air between these various pistons, the whole operation being due to the pressure of the air and in no way due to its velocity or kinetic effect.

The defendants' machine, as observed it, had the top of the air pipe marked A' in this photograph disconnected so that it was impossible to admit air directly to the top of the concrete receiver, so that in operating, the concrete was simply placed in the receiver and the inlet valve closed, and then the operator opened the throttle valve K, admitting air to the discharge pipe at E.

There was a gauge located on the main air supply represented by O in this photograph, and there was another guage attached to the top of the concrete receiver indicated by P in this photograph. When the throttle valve K was closed, the air pressure in the air line was from 65 to 75 pounds. It varied at different times slightly.

Immediately, when the throttle valve K was opened, the air in this line dropped to about 45 pounds or something like that, 40 or 45 pounds, in that neighborhood.

The gauge on the receiver, on the top of the receiver, indicated some pressure, that is the particular gauge that was being used on the machine. It was impossible, how-
[fol. 336] ever, to show what this pressure was, so a new gauge was brought up by Mr. Kirkman which was later attached to the machine at this point and this gauge would jump up to about 30 pounds immediately that the throttle valve K was opened.

They would both then gradually drop off, as the charge was discharged from the receiver, the gauge at the top of the receiver gradually working down to zero or nearly zero—I think about 7 pounds, something like that—and the gauge on the pipe, the main supply pipe, dropping to 20 or 25, around in that neighborhood, I have forgotten exactly.

I observed the operation in all ways that I could by listening to the concrete passing through the pipe, discharge pipe J, about 50 or 60 feet from the receiver, placing my ear to it and by observing it coming out of the pipe. I noted distinctly the passage of slugs through the discharge pipe J.

In one particular instance I had my ear against the pipe and the whole pipe made such a jump as the slug passed by, that it startled me and I jumped up. I heard smaller slugs distinctly going through.

In my opinion, there is no question but what slugs of various sizes were passing through the discharge pipe.

The operation without the top air inlet to the top of the receiver, in my opinion, is identically the same, for all practical purposes, as with it connected, because the air admitted to the point E in this photograph immediately blows up through the concrete in the receiver and con- [fol. 337] tinues to do so until the resistance to the upward flow is equal to the resistance to flow out through the discharge pipe.

As a result, at that particular moment, the pressure at the top of the receiver will be the same as the pressure at the point E, with the exception of the slight hydrostatic head, that possibly the concrete in the receiver causes, which would make a difference of possibly a pound or so according to the height of the concrete. In any case, it would not be more than three pounds.

Of course, this pressure of the air at the point E is more or less fluctuating, the fluctuations in some cases being large, which I will point out later, and in other cases being quite slight.

Whereas the pressure on top of the concrete in the receiver may not be affected by the slight fluctuations, it would be practically a steady pressure there, whereas at the bottom, there might be slight fluctuations. But when a large—or a pressure of a few pounds builds up at the bottom due to the slugs sticking a little bit at some point, or due to numerous slugs building up on the way out, the additional pressure will cause the air to flow up to the top of the receiver, so that I think it can be safely said that the pressure at the top of the receiver is substantially the same as the pressure at the point of discharge E.

Another thing which makes me believe, in fact proves to my mind that this is a pressure action purely and simply, is that this particular machine, when the air is turned on by the throttle valve K, with the opening through the dis- [fol. 338] charge pipe clear, shows a pressure at the receiver of about 7 pounds. There is nothing in the receiver then and nothing in the discharge pipe. That 7 pounds represents the pressure at the point E of the discharge pipe and represents the pressure head required to cause the flow of air, that quantity of air, the quantity that is available, to flow through the discharge pipe. It represents the friction loss and the velocity head of the air flowing through the discharge pipe.

If this was a kinetic machine, that flow could be established and the concrete dropped into it, and it would be carried on without any particular increase in that pressure. There might be a slight increase due to additional friction of this air flowing through there containing these particular ingredients distributed through it, but that would be very slight, not more than a pound or two. But in reality we find that it takes a pressure of about 45 pounds to start the thing off and gradually reducing as the charge is discharged.

The Court: Does it go up and down much?

The Witness: There is not much fluctuation in the pressure at the top. It gradually drops down due to the charge being worked out and less slugs offering less resistance. In certain instances it will go up, when a slug meets a bend or something and the rocks kind of get together so as to resist the motion then the pressure will go up.

[fol. 339] Q. 7. The gauge O, on what part of the apparatus is that located?

A. That was connected to the supply pipe back of the throttle valve, so it always showed the pressure in the pipe at that particular point.

Q. 8. And what was the distance from the point which this gauge tapped the supply pipe down to the outlet of the vessel?

A. A matter of six or eight feet, I should say. A 2-inch pipe, as I remember it, with several bends.

Q. 9. And this 2-inch pipe down at the bottom connects with the discharge pipe which was about what calibre?

A. Six inches.

Q. 10. Please state, if you can, what the difference in pressure between the gauge on the main supply pipe and the gauge P at the top of the vessel was due to?

A. It is due to the loss of pressure, of the air passing through that small piping from the point to which the gauge is connected into the point E of the discharge pipe.

Q. 11. When the air pressure was first turned on on the main air supply, how soon did the gauge at the top of the vessel rise?

A. Instantly.

Q. 12. Do you recall when the pressure on the main supply was about 45, about what pressure that the gauge P was?

A. Around 30, around in there. There was about 15 pounds drop under certain conditions.

Q. 13. And you say that the operation of the device satisfied you that the pressure at the bottom of the vessel and the pressure at the top was about the same?

A. Yes. I do not think there can be any question on that score.

[fol. 340] Q. 14. What was the quality or character of the concrete used in that test on October 7th? A. Well, it seemed to me a very peculiar type of concrete; hardly in my opinion, passable for such. It had some large gravel and fine gravel graduated down, and considerable amount of water, with apparently very little cement in the mixture. It seemed to be used for filling on the outside of the walls of the subway. Possibly anything would serve that purpose.

Q. 15. I refer you to Plaintiff's Exhibit No. 5, a blueprint in evidence, and ask you to state whether the operation that you have described in connection with the exhibition of the machine on October 7th is the same operation that will take place in the machine shown in the blueprint?

A. Yes, exactly the same. I compared this blueprint to the machine up there, and as far as I could see, it was identically the same.

Q. 16. I call your attention to Defendants' Exhibits L and M and N, and particularly to the photograph, Exhibit

N, where the material is shown discharging from the outlet or head. Can you tell us about what speed of discharge is indicated?

A. By this?

Q. 17. Yes.

A. No, I could not say about this, I could not say by this what is indicated.

Q. 18. What speed of discharge was indicated in the operation of the apparatus as you observed it?

A. Well, of course, I could not say exactly, but I observed that apparatus; I have observed other apparatus in operation; and my opinion is that the velocity of the concrete, the slugs passing through the pipe, may be some- [fol. 341] thing of the order of one hundred feet a second; maybe somewhat less than that. Something of that order, I should say, from my observation, without any exact measurements.

Q. 19. That is, the velocity of the slugs passing out of the discharge end of the pipe?

A. Well, right at the discharge end they may go faster, because at that particular point, near the end, and right at the end, there is an expansion of the air which is carried under pressure up to that point, and that expansion which occurs right at the end of the pipe, of course, would tend to drive on the concrete faster right at that point. I was speaking of the travel through the pipe itself before that end expansion takes place.

Q. 20. In your observations was the speed of the material passing through the pipe greater or less than the speed of the discharge?

A. It would be somewhat less than the speed of the discharge at that point. No doubt of it.

Q. 21. As I understand it, you have listened to the stuff passing through the line?

A. Yes.

Q. 22. And were able to form an estimate of the relative speed, more or less indefinite?

A. Yes, roughly.

Q. 23. What is indicated by that difference in speed of the material passing through the pipe and the material passing out of the end of the pipe?

A. Why, that, of course, indicates clearly that the pressure is carried right up to the end of the pipe and is released there when the slug passes out. I have seen other indications of that. In fact, some instances with these ma-[fol. 342] chines in operation, the release of the pressure is so sudden and there is such a considerable amount of pressure right at the end of the pipe, that after the slug goes by it comes out,—"boom," just like the low tone of a gun going off. You can hear it one hundred and fifty feet very readily. That, of course, is that sudden release of the pressure at the end of the pipe.

Q. 24. If the material were carried through the pipe in suspension instead of in slugs, what would be the effect on the concrete.

A. There would be a separation. The heavier material would lag back, if it could be done at all that way. If it could be fed into the air stream and sufficient velocity maintained to do that, there would be a separation and an entire separation of the materials.

Q. 25. And was there any such separation in the defendants' apparatus?

A. No, not to speak of. Not when it was operating with a better mixture. The first we saw there, they seemed to be cleaning out the machine and at one time they blew out what was mostly gravel and some rock. That is, some large gravel in with it. That did not appear in any way to be a concrete mixture.

Q. 26. And after that was discharged, what happened to the apparatus?

A. It was plugged. The apparatus was plugged right after that. There was one big slug that come out, a very large slug of gravel, when we first arrived on the scene, and then the pipe became plugged and it was an hour or two before they got it running again.

[fol. 343] Q. 27. What effect would the separation of the gravel and the finer aggregates of concrete have on the progress of the material through the discharge pipe?

A. It would have a very much more rapid flow with these pressures available. Liquid and the small particles would go through very rapidly, and the heavier parts would drag on behind.

Q. 28. Would that have any effect on the efficiency of the apparatus?

A. I think it would ruin it myself, for the purpose for which it was to be used. That is, it does not seem to me that such placement of concrete should be permitted.

Q. 29. Referring again to this photograph, Defendants' Exhibit N, if the exposure was one-tenth of a second and the material were being discharged at 100 feet per second, how far would that material move during the exposure of the film in the camera?

A. It would be ten feet.

Q. 30. And it would produce an appearance such as that you see in Exhibit N?

A. Oh, yes, clearly. The discharge there clearly forms streaks, which shows that there is a very considerable movement while the exposure is taking place.

Q. 31. Mr. Ray, I will ask you to compare the defendants' device and its operation with the specifications and the drawing of the patent in suit, and state whether you find in the apparatus the features of construction and operation described in the patent, which are referred to in the claims specified?

A. Do you wish me to refer to the various claims?

Q. 32. Yes. Refer to the features of construction of [fol. 344] the patent which are mentioned in the claims.

Mr. Morgan: Your Honor, that is a matter of law for the Court, and I object.

The Court: I sustain the objection. I do not want any testimony on that.

Q. 33. So then, Mr. Ray, please confine your answer to a discussion of the features of construction in the patent, and a comparison of them with the defendants' structure.

A. As shown on Plaintiff's Exhibit 3, the defendants' structure is identically the same for all practical purposes as the structure of the patent in suit. There are slight mechanical differences in the form of the receiver and, of course, the valves and the air piping and so on, and also a slight difference in the manner in which the air pipe is connected to the discharge at the bottom of the receiver.

In the patent in suit, it is shown, of course, entering through the top of the receiver, and then being carried

down and pointed into the discharge pipe; whereas, in defendants' device it is carried outside of the receiver and attached to the discharge pipe pointing in the direction of the flow. This slight mechanical difference, of course, in no way affects the operation, and the patent, as I understand it, is in no way limited to that particular mechanical construction shown in the patent drawings, but broadly covers the proposition.

Mr. Morgan: Your Honor, I do not want to interrupt the witness. The scope of the patent is a matter for the Court [fol. 345] and a matter of argument.

The Court: Absolutely.

A. (Continuing:) Well, I can simply state that the particular detail used in the introducing of the air supply to the discharge does not in any way affect the mode of operation of the device. In the defendants' structure as it stands at present, as shown in Defendants' Exhibit J, the air is introduced through the top of the receiver in a different manner from that shown in the patent in suit. That is, the air is taken from the air supply as connected to the discharge pipe and is carried up through the mixture in the receiver to the top of the receiver. It does this automatically as a matter of mechanics and of physics; and the same effect would occur in the device of the patent in suit if the pipe 8 were entirely removed from the top of the receiver. The device of the patent in suit would operate just the same as it operates with that pipe. The essential feature; in fact, the peculiarity of this device of the patent in suit, is that the concrete or the charge is permitted to flow bodily as rapidly as it can under the conditions existing directly into the discharge pipe, this flow being automatically governed by the pressures existing on the top of the concrete and at the point of discharge of the receiver into the discharge pipe. This is the distinctive characteristic in which this device of the patent in suit differs from kinetic devices which are common in the prior art. In kinetic devices, it is necessary to establish a high velocity of air or other gas and to take precautions to prevent the substance [fol. 346] which is to be carried from flowing freely into the discharge pipe, else the whole system would break

down and the discharge pipe would become plugged, and that is the end of the operation.

In old kinetic devices the material in the first place must be in granular form so to be readily subdivided into its smaller particles, and in the second place it must not feed too rapidly into the discharge pipe. Furthermore, in kinetic devices there is no pressure at the bottom of the receiver, or else a very slight one, in fact, in the great majority of them they have a vacuum at this point, that is, at the point of discharge of the receiver.

As I said before, the operation of the McMichael device and the defendants' device depends upon a distribution of pressure between the top of the receiver on top of the concrete and in the discharge pipe at the bottom of the receiver, and this distribution of pressure, this relation between those two pressures is constantly changing, thereby permitting the feeding of the concrete into the discharge pipe, carrying it on by the pressure resulting in a drop of pressure at this point and further feeding of the concrete, and so on.

Q. 34. When you observed the defendants' machine in operation, how did the pressure on the main gauge come down?

A. It came down fairly gradually. There were little slight fluctuations, but not very marked, and it would hardly be expected that it would show much fluctuation at the point; a gauge attached directly to the bottom of the receiver at the discharge pipe would show greater fluctuations without any doubt.

[fol. 347] Q. 35. It is your opinion that the fluctuations and pressure at the discharge outlet were absorbed to a great extent between the pipe and the gauge at that outlet?

A. They would not show so marked on the gauge as they would at the discharge.

Q. 36. Can you state what effect the peculiar discharge head used by the defendant had on the manner in which the material was discharged?

A. It has a tendency to absorb the fluctuations and preventing the violent downward discharge of the concrete.

In other words, the concrete flowing through the pipe continues on due to its velocity and being heavier than the

air and hits the blocked end at 50 and then drops down more quietly than it would otherwise.

By the Court:

Q. 37. Is that particular defendants' apparatus the only one that has been shown to you?

A. That is the only one we saw.

By Mr. Cox:

Q. 38. I want you to state briefly whether it would have been possible at that operation that you saw on October 7th to convey that concrete from the apparatus which I believe was 55 feet below the street level, up around the eight or more bends in the pipe, to the street, kinetically, and why?

A. I would not say that such a thing was possible if sufficient air was available, sufficient velocity. However, [fol. 348] with the air that was available and the velocities that did occur, that would be absolutely impossible. It is the simplest thing in the world to see that such would be the case.

Now, air moving through that pipe had a velocity of 100 feet a second; that represents a velocity head of about 150 feet of air. Water moving through that pipe at 100 feet velocity represents a velocity head of 150 feet of water; and so on with any liquid.

In other words, the velocity with which liquid or gas is moving, the same velocity always gives the same velocity head without regard to the particular thing that is moving. 150 feet of air would represent about a little less than 2/10ths of a foot of water, which is about 1/10th of a pound pressure. In these kinetic machines the moving power of any stream flowing depends upon the velocity head, the difference of velocity between the velocity of a particle being carried and the velocity of a fluid. So if the stone or concrete or what not in this pipe was not moving at all, but this stream of air moving at 100 feet a second was impinging upon it, it would represent a pressure of about 1/10th of a pound per square inch against that particular object. Well, of course, that naturally would not move the rock and would not carry it out. It would not do anything.

In fact, it takes many pounds of pressure to do it, to move up that concrete. I could not say what velocities offhand it would take in the pipe. They could be approximately calculated with any given sized stone and so on, but it would take a velocity of many hundred, possibly thousands of feet [fol. 349] a second to do it, and no such velocity as that is possible.

Q. 39. What effect would that have on the apparatus Could you build an apparatus strong enough to stand that sort of thing?

A. I would not say what could be done, but the kinetic system is not feasible from other standpoints. In other words, with concrete consisting of large stones and with the fine sand and fine gravel and more or less viscuous mortar all connected together, it would be very difficult to make the kind of an apparatus in which that mixture could be fed in uniformly into the moving air, so it could be conveyed kinetically to begin with.

In my opinion, the whole thing is impossible with concrete. With grain and sand and such things, they can be fed in very uniformly and be picked up and carried on with reasonable velocities. They are small. The smaller the particle, of course, the greater the area in proportion to its weight. The areas which are subject to the pressure of the moving air varies as the square of the dimensions, whereas the weight varies as the cube of the dimensions, so velocity of 100 or 200 feet a second might carry along grain very nicely, whereas to carry rocks an inch or two in diameter, would require velocities very much greater.

Q. 40. What would be the effect on the operation of the defendants' apparatus and the apparatus of the patent in suit if the air valve at the top of the vessel were opened so as to admit too rapidly or more rapidly than the necessities of the machine required?

A. Which valve are you referring to now?

[fol. 350] Q. 41. I am referring to opening the top valve on the vessel quickly and admitting a large volume of air under pressure?

A. Before the bottom air supply is opened?

Q. 42. Before and after.

A. There is, of course, if it is opened before in particular, a tendency of pressing the concrete in the receiver down in

the discharge, there is a tendency of jamming it there. If the air pipe to the discharge is opened first and then the air turned on at the top, then the lower pressure, lower jet, lower pressure at that point, takes care of it and carries off the slugs without jamming. Building a higher pressure on the top of the concrete tends to make it feed faster, tends to carry larger slugs, tends to make the slugs larger and, of course, there is more danger of blocking, particularly if there is not sufficient air.

Q. 43. Is it then quite possible to plug up the material and put it out of operation by admitting too much air to the top?

A. I think that could be done if too much pressure were admitted at the top, yes.

Q. 44. When you observed the operation of this machine on October 7th and after the operation was completed, what was done with the machine?

A. Simply closed down, the air valves closed off, nothing further done that I observed. I waited around some time but nothing further was done as far as I saw.

Q. 45. How long were you there?

A. Maybe fifteen minutes or half an hour. Then I went up the next morning. It apparently had not been used any further. It was not being used then.

Q. 46. Was the apparatus washed out when the operation [fol. 351] was completed?

A. Not as far as I saw, nothing of that kind was done as far as I observed.

Q. 47. And did the operator go away and leave the apparatus without doing that?

A. Yes.

Mr. Morgan: That is, as far as you know?

The Witness: As far as I saw at the time. He might have come back, of course; I don't know.

Q. 48. I want you to say as to whether you found in the defendants' apparatus as observed by you a receiver at the top of the vessel separated from the vessel by a door or seal.

A. Yes. There is such a receiver. It is marked G in that photograph, and the hopper; the valve is just below it, by A.

Mr. Morgan: What are you referring to now?

Mr. Cox: I am referring to photograph of defendants' apparatus.

Mr. Morgan: Plaintiff's Exhibit No. 3? Please put that in the record.

Mr. Cox: He is talking of the apparatus as he saw it.

Mr. Morgan: When?

Mr. Cox: When he says he saw it.

Mr. Morgan: When did you see it?

The Witness: This last week.

The Court: October 7th.

Mr. Morgan: Just so it is clear.

The Witness: Yes, there was a receiver in the apparatus.

[fol. 352] Q. 49. Was there a bend in the discharge pipe at a point adjacent to the chamber?

A. Yes, there was.

Q. 50. Was there a discharge duct extendnig through the chamber in a horizontal plane?

A. Yes, there was.

Cross-examination.

By Mr. Morgan:

X Q. 51. Are you the Mr. Ray who testified as an expert for the plaintiff in the prior suit against the Ulen Contracting Corporation?

A. Yes.

X Q. 52. In your testimony as to the form in which the discharged matter passed through the pipe and to its velocities, you were simply drawing inferences from listening?

A. Not entirely.

X Q. 53. You could not see it in the pipe, could you?

A. See the discharge in instances.

X Q. 54. But the pipe was an iron pipe?

A. Yes, in these cases.

X Q. 55. At the point of discharge did you test the velocity of discharge or just estimate it from your eye?

A. No. I had no way of testing it at the discharge; but in some cases it has been possible to hear it coming from when it left the receiver until it reached the discharge, and a rough estimate could be made that way.

X Q. 56. And when you saw this on Thursday, as the material was discharged on the street, was it not into a box?

A. That is correct.

X Q. 57. And it was discharged through a pipe plugged at the end with a slot inside?

A. Yes.

X Q. 58. And there was a tin plate placed over the pipe for the splashing?

A. Yes.

[fol. 353] X Q. 59. Did you not observe that after the charge was discharged into the box, that the stone was in a mass practically beneath this slot in the pipe?

A. In the first instance I referred to, I spoke of that very fact, but in my opinion that was due to the fact that the mortar was nothing more than water with a mere coloring of cement. Of course, naturally the water would flow away, leaving the stone there. It was not like a concrete mixture.

X Q. 60. You made no test whatsoever as to the proportions of cement, sand, water and stone in the charge delivered, did you?

A. Just from observation, I did.

X Q. 61. You made no test? Please answer my question.

A. What do you call a test?

X Q. 62. Anything you like?

A. All right, I am giving my test; by my observation of the consistency of it and by various members of the party taking it up in their hands and observing it.

X Q. 63. Those were the only tests?

A. Yes.

X Q. 64. And in the subsequent discharges of material, did you notice that a blast of air came out first?

A. Why, certainly.

X Q. 65. And did you notice that next came out a thin mixture of sand and cement and water?

A. No.

X Q. 66. You did not?

A. No. I saw in one case——

X Q. 67. And you and I——

Mr. Cox: Let him answer his question, please.

[fol. 354] A. (Continuing:) I saw in one case a very large slug of gravel of various sizes coming out.

X Q. 68. You and I, Mr. Ray, were standing within ten feet of that box, quite near to each other, were we not?

A. Yes.

X Q. 69. And did you not notice after this thin discharge of sand, cement and water, came out, that the bulk of the stone came out in one mass right at the end of the discharge. Did you not see that?

A. No, I would not say that that were so, except in that first instance, which appeared to be a case of cleaning out the machine as far as I could determine.

X Q. 70. You and I were standing practically side by side within ten feet of that box, were we not?

A. I think we were.

X Q. 71. Was not that true of the last discharge, just as I have outlined?

A. You mean the last one that occurred while we were there?

X Q. 72. Yes.

A. No, I did not think so. I saw the sand and gravel of various sizes and the concrete fluid, whatever it might be, coming out together, but possibly I could not say that, that every portion was perfectly mixed. I would not pretend to say that, but I would say they came substantially together for practical purposes.

X Q. 73. And the material that was discharged into the box was put into a buggy and taken across the street and used on the other side of the street?

A. Yes.

X Q. 74. Did you observe, Mr. Ray, that one of the workmen who filled those buggies from the box, shovelled the stone from directly beneath the slot in the pipe and put it in the buggy?

A. Certainly.

[fol. 355] X Q. 75. And did you not notice that the liquid, the fluid sand and cement and water was bailed up in a bail from the other side of the box?

A. Of course. It was not a real concrete mixture, as I said before.

X Q. 76. And you also said that you did not test this mixture as to its relative components?

A. I observed it pretty carefully.

X Q. 77. But you did not test or measure it in any way, did you?

A. No, not scientifically.

X Q. 78. Are you familiar with steam piping in the ordinary buildings for heating?

A. More or less.

X Q. 79. Have you heard water hammers in the steam piping?

A. Yes.

X Q. 80. In plaintiff's patent in suit compressed air is admitted through the pipe 8, is it not, above the concrete in the receptacle 2?

A. Through the pipe 8?

X Q. 81. Yes.

A. Yes.

X Q. 82. And this air pressure forces the concrete downward into the discharge pipe 13?

A. Under certain conditions.

X Q. 83. Is that the statement of operation of the mechanism in the patent in suit?

A. It says the top air is to apply a uniform pressure to the entire mass surface and without any substantial penetration of air itself into the interior of the mass.

X Q. 84. Is that the only statement of the patent in suit as to the operation of the top air?

A. There may be others. I will have to look through that.

X Q. 85. You have been testifying rather positively as to this devise.

A. You are asking me exactly what the patent states, as [fol. 356] I understand your question. It says on page 1 that,

"The air inlet into the chamber being preferably near the top thereof, and the passage of air through the connection 8 being controlled by a valve 9."

X Q. 85. Please state whether or not the concrete shown in the receiver in the drawing in plaintiff's patent is not impervious to air?

A. I should say that with the air on top, for all practical purposes, it would be impervious to it.

X Q. 86. Your answer to my last question then is yes?

A. No, it is not yes. It is just as I answered it. It depends on your meaning of your term "impervious."

X Q. 87. I mean the usual dictionary meaning of that term; you will find it in any standard dictionary.

A. This concrete mass in the receiver of the usual consistency in that respect would not be much different from water. Placing air——

X Q. 88. We are not interested in mortar.

A. Water. I am talking about water. Pressure of air placed on the top of water in a vessel, for practical purposes the water can be said to be impervious to air, but that does not mean that under other conditions that the air would not pass right through the water.

X Q. 89. I am asking you again to look at the drawings of the patent in suit and state whether or not the concrete in the receptacle 2 in that drawing is or is not impervious to air?

A. Under the conditions set forth in the specifications, when that statement was made, it is for all practical purposes impervious to the air.

[fol. 357] Redirect examination.

By Mr. Cox:

R. D. Q. 90. Mr. Ray, will you please refer to the prior patents discussed by the defendants' expert and explain briefly what is shown there?

A. I am not certain that I have——

The Court: He discussed but two or three as I remember it.

A. (Continuing:) I believe he discussed patent to Warren No. 671,303. This is a mere kinetic device similar to many others discussed in the prior case, in which sand was fed in gradually into a moving stream of air and carried along by it kinetically. In this case it shows means to admit pressure at the top of the sand receiver so as to cause the sand to flow down through the restricted opening more uniformly, just as common in many others. It says, page 1, line 67:

"into the blast of air, with which it mingles and by which it is carried through the chamber into the flexible tube M and discharged through the nozzle O."

The patent to McIlvrid, 958,421, shows a grout mixer consisting of a closed chamber with mechanically operated paddle wheels into which is placed the mixture of cement, sand, water, possibly very fine gravel, and there mixed together. Then the air pressure is placed above the body of the liquid in this receiver and forced out through a dis- [fol. 358] charge pipe and through a hose, into a place to be used, at the bottom, just as if it was water. That is a case of pure fluid flow under pressure in a receiver.

The patent to Canniff, 873,345, shows also a grout mixing and discharging apparatus, having a closed receiver for the cement, sand, water, possibly fine gravel. The particular novel feature of this is that air from the air supply is permitted to flow down through the bottom of the receiver, bubbling up through the mixture, and thereby mixing it together. After it is mixed, a three-way valve is turned, shutting off the air at the bottom and permitting a pressure at the top when the fluid mixture flows through a pipe and through a hose to the point to be used, just as if it was water. Another case of pure fluid flow through a pipe under pressure.

R. D. Q. 91. Do you find any distinction made in the patent in suit between the grout and concrete?

A. Yes. Grout is defined in the patent in suit as a mixture of sand and cement and water, possibly fine gravel; whereas the concrete has the rock and usual ingredients. It distinguishes clearly, and refers to the prior art, that in the prior art there were these grout-mixers and conveyors, this very type shown in the Canniff patent.

That patent to Davidson is a kinetic device pure and simple. The air current is obtained by a blower or fan of the centrifugal type which commonly is capable of only developing a pressure of a few ounces, and in this case the [fol. 359] velocity of air from this blower passes through the pipe, and tobacco leaves, wood chips and tea leaves are fed into the pipe and are conveyed kinetically by the moving

stream of air and floated along; similar to many devices of the prior art.

The patent to Beach, 267,318, shows a pneumatic conveyer for conveying grain possibly, or other objects, in a state of suspension in the air in the tube and without contact with the sides of the tube. This is like all the kinetic devices in that there is a current of air passing rapidly through a tube and from a receiver there is fed the fine granular substance regulated through a valve so only a given quantity is fed into the current, and it is carried kinetically or floated by the current and discharged into a peculiar kind of discharge tank where, if desired, it is picked up again and goes through the same operation, and is carried further. In the receptacle for the grain or other granular substance there is at the top connection for air pressure, so it can be fed more uniformly, if desired; but this patent does not require air pressure at any point. In fact, it can operate under vacuum. It is a pure kinetic machine, and as far as I can see, has no bearing on the patent in suit.

The last patent is the patent to Smith, 122,498, which shows a peculiar form of concrete mixer, the idea being to use a very fluid mixture which is capable of flowing out of that concrete mixer directly in many instances upon the road which this machine is particularly adapted to build. [fol. 360] The concrete flows from the mixer through these pipes to the middle of the road and spreads out so that it spreads all over the road and forms the concrete surface. Under other conditions, where they would have to lift it to a point higher, and where gravity is not sufficient, they first let the mixture flow into a receiver, which is then closed, and air pressure is applied to the top and it then flows out through the pipe. In either case it is nothing more or less than a pure fluid flow caused either by gravity or the pressure of the air on the top of the surface of the concrete in the closed vessel.

R. D. Q. 92. Mr. Ray, I want to ask you a question about the machine shown by the sketch introduced by Mr. Artingstall, Defendants' Exhibit E. Please tell us how that machine, the two machines shown on E would operate, with grout?

A. With grout they would operate with the top pressure only. In fact, as grout is used, it is injected into a closed space, the idea being to fill up that space. In my opinion if air was injected into the grout and carried along with the grout, it would defeat the whole purpose of the use of such a machine. In other words, these grout machines are used for obtaining a fluid flow of the grout through a hose. That is the pure grout just as you would take water out of a garden hose under pressure, pressure at the discharge, and the discharge of this hose is introduced as tightly as possible in the particular point where the grout is to be used, and the grout forced in under pressure so as to fill up cavities completely.

[fol. 361] R. D. Q. 93. Taking Fig. 2 of Exhibit E which I believe Mr. Artingstall has said was used for concrete or something of that nature, can you state about how that would operate?

Mr. Morgan: That is his opinion how it would operate.

Mr. Cox: This is all opinion, of course.

Mr. Morgan: As long as it is understood.

A. If such a device was constructed and operated with concrete, it would operate, if at all, with concrete in the same manner as the patent in suit operates. In other words it would be a pressure device if it operated whatever with concrete. In other words, as I have stated time and again, it is my opinion that it is impossible to handle concrete with any kinetic device so far developed, at least.

R. D. Q. 94. What would be the effect of the large diameter bottom pipe extending to the left of the discharge opening?

A. It would, of course, reduce the velocity of the air from the supply pipe, so that there could be no possible kinetic effect like a nozzle at the bottom of the receiver.

R. D. Q. 95. What effect, if any, would that have on the efficiency of the machine?

A. It would spoil it for a kinetic machine.

R. D. Q. 96. Mr. Ray, what is the weight of concrete?

A. About one hundred and fifty pounds to the cubic foot.

R. D. Q. 97. What is the relative weight of air and water?

A. Well, air at atmospheric pressure is about one eight-

[fol. 362] hundredth part of the weight of water.

R. D. Q. 98. And what is the specific gravity of rock?

A. That varies a great deal.

R. D. Q. 99. Taking limestone?

A. Two to three times the weight of water; sixteen hundred to twenty-four hundred times the weight of air at atmospheric pressure.

H. B. KIRKLAND, called as a witness on behalf of the plaintiff, in rebuttal, having been previously sworn, testified as follows:

Direct examination.

By Mr. Cox:

Q. 1. Mr. Kirkland, have you heard the description of the construction and operation of defendants' apparatus and the conditions thereof on October 7th, at the Queensboro subway extension, given by Mr. Ray?

A. Yes, sir.

Q. 2. Please state whether or not that description is correct to your own knowledge and is in accord with your observations made at the same time?

A. Yes, sir.

Q. 3. Mr. Kirkland, you have stated in your previous testimony that the pneumatic concrete placing machines made under the patent in suit, made a saving of one-third to one-half over the cost of hand placing not under air pressure. Is the saving greater or less under air pressure?

A. It is greater under air pressure.

[fol. 363] Q. 4. Has the extensive use of the apparatus which you testified to about some year and a half ago continued since that time?

A. Yes, sir.

(No cross examination.)

STIPULATION RE TESTIMONY OF WM. H. LARKIN

(It is stipulated between counsel that the witness William H. Larkin, if called, would testify to the same effect as the last witness, relating to the construction and operation of

the defendants' apparatus and as has been testified to by Mr. Ray.)

SUR-REBUTTAL PROOFS

ALAN M. JOHNSON, called as a witness on behalf of the defendants, in sur-rebuttal, being duly sworn, testifies as follows:

Direct examination.

By Mr. Morgan:

Q. 1. Mr. Johnson, please state briefly and clearly what you saw when the concrete was discharged from the pipe at the Forty-second Street tunnel on last Thursday.

A. Do you not want me to state I am counsel also in this case?

Q. 2. Yes, go right ahead and make that statement.

A. As associate counsel in this case, I was present at this [fol. 364] inspection of the blower and the material was blown up on the street into a box. It was very wet. The first blow, some of the rock came out and then the pipe stopped up, and there was probably an hour or hour and a half until it got running again. After it was successfully run, the operation was like this:

First, there came out of the pipe air, which I suppose was the air left in the pipe. Then a few stones that may have been left from the preceding blow. Then a large quantity of water, sand and cement; and then a large mass of stone by itself. And that material was removed from the box by the laborers, some of whom shoveled out the rocks and others bailed out the liquid by a bail into a buggy, I think they call it.

Cross-examination.

By Mr. Cox:

X Q. 3. Mr. Johnson, how long did it take to discharge the whole batch of concrete?

A. I did not time it, Mr. Cox. You were right there. It took a few seconds. I did not have a stop watch or anything of that kind. It was an appreciable time.

X Q. 4. What is your best recollection? You were out to observe it particularly?

A. We all were. We were right around the box.

X Q. 5. This stone that you mentioned——

The Court: When you ask him what his recollection is, do not mix your sentence up. What is his recollection?

[fol. 365] X Q. 6. What is your recollection as to the time?

A. A few seconds between the air that came out and the water, sand and cement, and then one, two or three, I do not know how many seconds, Mr. Cox, between the batch of stone which was practically by itself. In fact, the material separated in the pipe.

The Court: He is not asking you that. He is asking how long it took to observe this batch.

The Witness: Is that the question?

X Q. 7. Yes.

A. I did not time it. I could not tell. A few seconds.

X Q. 8. A few seconds?

A. I could not tell. I do not know.

The Court: One second?

The Witness: Oh, no, I should say more than ten or fifteen seconds. Maybe twenty.

X Q. 9. That is more than a few, is it not?

A. Well, I do not deal with seconds very much, sir.

X Q. 10. What you saw and what you testified to took just a few seconds, did it not?

A. I will say from what I saw, I should say it took from five to twenty seconds or maybe twenty-five seconds.

X Q. 11. Did it take twenty seconds to discharge this stone that you speak of?

A. Not after it came; but you are speaking now about the entire blow; that is, the first air——

[fol. 366] The Court: The entire blow before they admitted the new batch?

The Witness: Yes, sir.

X Q. 12. I want to ask you, Mr. Johnson, what was the consistency of that concrete?

A. It was as thin as soup, sir.

X Q. 13. And the water could be seen on the top of the box in which it was discharged after it had settled in the box?

A. Oh, yes. The water ran off around the side of the box, and the stone came down in its own pile right underneath the slot.

X Q. 14. You could see the water on the top of the mixture when it was discharged in the box standing there?

A. The water and cement and sand seemed to stand by itself.

X Q. 15. I say you could see the water on top, pure liquid?

A. It was colored, you know. Colored with cement.

JOHN P. FITZGERALD, called as a witness on behalf of the plaintiff, in rebuttal, being duly sworn, testifies as follows:

Direct examination.

By Mr. Cox:

Q. 1. Where do you reside, Mr. Fitzgerald?

A. New Jersey.

Q. 2. For a number of years past have you been engaged largely in setting up and operating pneumatic concrete placing machines?

A. I have, yes, sir.

[fol. 367] Q. 3. Did you witness the operation of defendants' machine at Broadway and Forty-first Street on October 7th?

A. I did.

Q. 4. I want you to tell me what the character of that concrete was that they were using there.

A. It was very poor concrete. It was very sloppy, and would not be passed by any inspector under any circumstances.

Mr. Morgan: I object to that, your Honor, and move to strike out it would not pass inspection.

The Court: Motion granted.

Q. 5. Have you observed the character of concrete required by inspectors and engineers on the jobs you worked on, very carefully?

A. Yes, sir; always.

Q. 6. How did this concrete compare with it?

A. Very poorly.

Q. 7. Do you know the action of concrete after it is mixed and placed?

A. I did not get that.

Q. 8. Do you know the action of concrete after it is mixed and placed?

A. Yes, sir; I do.

Q. 9. Would that concrete form satisfactory concrete?

A. No, sir; it would not.

Q. 10. Now, how long did it take to discharge a batch of that apparatus?

A. Better than a minute.

Q. 11. More than a minute?

A. Yes, sir.

Q. 12. And do you know Mr. Johnson, who is sitting here?

A. I do, yes, sir. I do not know him. I saw him.

[fol. 368] Q. 13. Was he there at the time?

A. Yes, sir; he was.

Q. 14. When this operation took place on the 7th of October?

A. Yes, sir; he was.

Q. 15. And you were dressed in your khaki clothes?

A. My working clothes, yes, sir.

Q. 16. Did you have any conversation with Mr. Johnson?

A. No, sir; only he made some remark about the concrete, and I said, "Very unusual to be as wet as that." And he told me to keep quiet, something like that.

Q. 17. Did he know who you were?

A. I do not think he did, no, sir.

Q. 18. Mr. Fitzgerald, how did the concrete come out of that machine on October 7th, at the discharge pipe?

A. It came out in sections. I would say, first came in sections of concrete, then air, and then sections of concrete.

Q. 19. Was the concrete separated?

A. No, sir.

Mr. Cox: I have a model that Mr. Ray has made, demonstrating the operation of this machine in glass. I think we can use that.

Mr. Morgan: I object to that.

Mr. Cox: I would like to have Mr. Ray produce that. It is very interesting; just to say he made that model, and so on.

Mr. Morgan: This is with reference to the operation of a heavy cast iron outfit.

The Court: Never mind that.

(Both sides rest, and argument set for Friday, October 15th, 1926, at 3:30 o'clock P. M.)

[fol. 369] Friday, October 15th, 1926.

(Plaintiffs counsel introduced in evidence a copy of the specifications of the Transit Commission, under which the work on the Queensboro Extension was done by the defendants, subject to correction.)

(Marked Plaintiffs Exhibit No. 19.)

[fol. 370] PLAINTIFF'S EXHIBIT NO. 1

Stipulation

1. It is stipulated by and between the parties hereto that the plaintiff is a corporation organized and existing under and by virtue of the laws of the State of Illinois, having its place of business in the City of Chicago, in the County of Cook and State of Illinois, and that said plaintiff is the owner of all right, title and interest in and to patent 1,127,660, the patent in suit, and of all claims and demands for profits and damages for past infringement thereof.

2. It is further stipulated and agreed by and between the parties hereto that an ordinary uncertified copy of the opinion of his Honor Augustus N. Hand and similar copies of other papers on file in the suit in this Circuit, entitled "Concrete Mixing & Conveying Company vs. Ulen Contracting Corporation & Shandaken Tunnel Corporation" may be referred to and offered in evidence in this suit with the same force and effect as a certified copy of said opinion or other papers subject to correction of any errors.

3. It is further stipulated by and between the parties hereto that the ordinary Patent Office printed copies of the U. S. domestic patents, and the ordinary printed copies of foreign patents may be used in evidence with the same force and effect as regular certified copies, subject to correction, if errors should appear.

[fol. 371] 4. It is further stipulated by and between the parties hereto that the claims of the McMichael patent 1,127,660 sued upon are the same claims as those passed upon by his Honor Augustus N. Hand, to wit: Claims 2, 4, 6, 17, 21, 22, 28, 34 and 35, and also claims 5, 8, 9, 12, 15, 19, 24, 31, and 32.

5. It is further stipulated that an ordinary uncertified soft printed copy of the patent in suit, printed by the U. S. Patent Office, without the grant, may be used with the same force and effect as the original patent.

Stephen J. Cox, Solicitor for Plaintiff. John D. Morgan, Alan M. Johnson, Solicitors for Defendants.

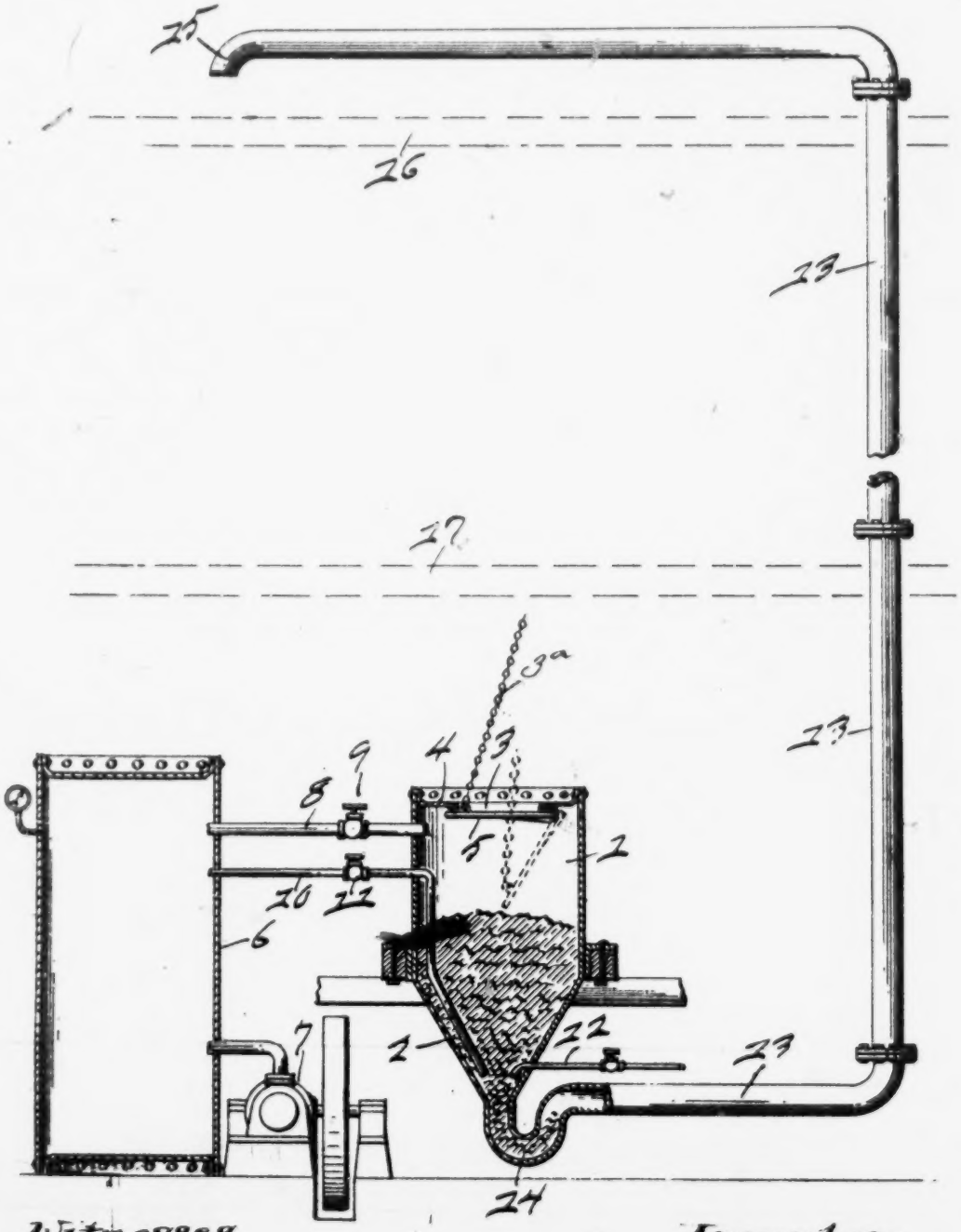
Dated New York, N. Y., May 3, 1926.

J. H. McMICHAEL.

METHOD OF AND APPARATUS FOR TRANSPORTING AND TREATING CONCRETE.

APPLICATION FILED JAN. 14, 1907. RENEWED JAN. 23, 1911.

1,127,660. Patented Feb. 9, 1915.



Witnesses,
A. J. Darton
M. A. Tracey

Inventor,
J. H. McMichael
By Carl H. Keller
Atty.

UNITED STATES PATENT OFFICE.

JOHN H. McMICHAEL, OF TOLEDO, OHIO, ASSIGNOR TO CONCRETE MIXING AND CONVEYING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

METHOD OF AND APPARATUS FOR TRANSPORTING AND TREATING CONCRETE.

1,127,660. Specification of Letters Patent. **Patented Feb. 9, 1915.**

Application filed January 14, 1907. Serial No. 352,089. Renewed January 23, 1911. Serial No. 604,236.

To all whom it may concern:

Be it known that I, JOHN H. McMICHAEL, of Toledo, county of Lucas, and State of Ohio, have invented certain new and useful Improvements in Methods of and Apparatus for Transporting and Treating Concrete; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form part of this specification.

This invention relates to a method of and an apparatus for transporting and treating concrete.

The invention has for its object to provide a method of and an apparatus for elevating and transporting material of the character mentioned in a more expeditious manner and with greater facility than is possible by the employment of ordinary methods and mechanisms.

In carrying out my invention I employ the apparatus illustrated in the accompanying drawing, the same being shown partly in section.

Referring to the details 1 is a receiver or chamber for the material to be treated or transported, the lower portion of the chamber being conical or hopper-like in form as indicated at 2. The cover or top 4 is provided with an upstanding circumferential rim which adapts it for use as an initial receiver or charge holder for materials to be deposited in the chamber 1. The cover 4 is provided with an opening 3 in which there is a door or removable seal 5 hinged or otherwise mounted so as to close the opening when it is in the position indicated by the full lines of the drawing.

3ª is a chain or rope connected with the seat and adapted to be used for partially or entirely closing it and holding it in closed position.

It will be observed that if air pressure is supplied to the interior of the chamber, (as will be hereinafter described) after the seal is closed or nearly closed it acts upon it and aids in holding it in closed position.

6 is a pressure tank or reservoir for compressed air supplied by an air-compressor 7, and 8 is a connection leading the air under pressure from the tank to the chamber 1, the air inlet into the chamber being preferably near the top thereof, and the passage of air through the connection 8 being controlled by a valve 9.

10 is an air-pipe controlled by a valve 11, and also leading air into the chamber, the delivery end of said pipe being at or near to the discharge or lower end of the hopper 2. There is also a valve-controlled water supply-pipe 12 adapted to deliver water at the lower end of the hopper when desired.

Leading from the lower end of the hopper 2 is a conveying-tube or discharge duct 13 having a crook or U-shaped bend 14, the delivery end of the conveying-tube being at 15. The broken lines 16 and 17 indicate the floors of a building, the conveying-tube in the illustration, being shown directed upward to elevate the material deposited in the chamber, the delivery end extending in a lateral direction to deliver the material at the most convenient point on the floor.

In operation, the material to be elevated is deposited in the chamber through the opening therein, falling into and occupying the hopper-like lower portion thereof, as shown. The door for the opening in the chamber is then closed and the air turned into the chamber from the reservoir, the air in which may be maintained under any desired pressure. The instant the air is turned into the chamber the door for the closure will be firmly held in closed position by the air pressure. Owing to the pressure in the receiver the material in the hopper will be forced downward and directed into the conveying-tube, being carried along by the latter until it is finally discharged at 15. Owing to the provision of the U-shaped bend in the conveying-tube immediately after leaving the hopper, the material will be more or less tightly packed as it is directed therethrough. To provide the required amount of moisture to serve as a lubricant to start the material out of the hopper and also to aid its movement within the conveying-tube, water from the pipe 12 may be turned into the lower part of the hopper to mix with the material as it enters the conveying-tube. This water introduced through the pipe 22 and mixed with the other materials gives increased fluidity to the mass and permits it to be more readily handled.

As long as the air pressure in the chamber is maintained, the closure for the opening thereinto remains closed. However, the instant the material is discharged from the end 15 of the conveying-tube, the air pressure will drop and the door will open automatically and serve as a signal to the operator of the apparatus to shut off the air to the chamber. On account of the high air pressure serving to hold the door 5 in closed position, the supplying of material for the next charge can be commenced as soon as the door has been closed. In this way time will be saved at each charge. The material which accumulates in the charging region 4 will be automatically discharged into the chamber 1, as soon as the pressure is sufficiently relieved by the discharge of the material out of the end of the pipe at 15, to permit the seal to open.

To loosen the material at the lower end of the hopper and to assist its movement, I provide the additional air-pipe adapted to discharge air into and through the material.

It will be observed that the pipe 8 serves primarily to produce the air pressure in the chamber 1, and maintain it until the charge is expelled. The lower air pipe 10 which extends to a point immediately adjacent the delivery pipe or discharge duct 13 serves the double function of preventing choking in the entrance to the delivery pipe and of supplying air under pressure in sharp jets directly to the delivery pipe itself. I have found that the supplemental air pipe 10 is very effective in aiding the passage of the material into and through the conveyer pipe. The pressure in the chamber supplied through the pipe 8, is, of course, to a certain extent expended in overcoming friction, and in cases where the friction is serious, the second air pipe located at or near the entrance of the delivery pipe, gives to the material the velocity which is needed to carry it to the remote point of delivery.

It will be observed that the upper air pipe 8 serves merely to supply air to the upper part of the chamber, 1, the pressure of the air being uniformly applied over the entire upper surface of the mass. The lower pipe 10, however, serves to direct a jet of air moving at a considerable velocity directly against portions of the mass as they move toward and into the discharge duct. The two pipes thus act in very different ways, the upper pipe supplying air which acts by pressure and the lower pipe supplying air which acts by velocity. On account of the presence of large and small particles, and on account of the presence of water, a mass of concrete forming materials (whether completely mixed or not) is relatively compact and impervious to air, and on this account the upper air body acts by applying a uniform pressure to the entire upper mass surface and without any substantial penetration of the air itself to the interior of the mass. Air from the lower pipe 10 may force itself into the body of the mass, and the relatively small air jet acting upon the relatively large stream of outward moving materials directly engages with the sub-masses to push them along. This action of the two air bodies in my apparatus is to be contrasted with the action of air in earlier devices which were so constructed that light materials such as grain or ashes could be caught in large moving air bodies and carried along in suspension with each particle separated from the others. One of the strongly marked and novel matters incident to this provision of the pipe 10 for introducing air directly into the discharge pipe, whether considered by itself or considered as supplemental to the agency such as the air from pipe 8 tending to effect downward and forward propulsion of the entire mass, is this, that the rapidly moving air from pipe 10 acts upon sub-masses, successively of the general mass, at points near those where they enter the delivery pipe, the result being that the thorough commingling of the ingredients (rock pieces, sand, cement and water) well understood by the engineer to be essential to a perfect concrete, can be attained with great rapidity and with a perfect, uniform, distribution of the various ingredients as concerns the relative positions of all the component particles.

As is well known, the material referred to as concrete is a composition containing relatively large pieces of rock or stone, as uniform in size as possible, together with predetermined proportions of sand, cement and water. The purpose of this composition is, ultimately, to have, in a desired position, a hard rock-like body which will resist disintegration and fracture. The relatively large pieces of rock components must, in order to attain this end, be thoroughly coated, over all their faces, with a layer of the binding material (cement, sand and water) in the proper proportions, chemically, to insure that, from and after the instant of commencement of the "setting" or crystallizing action of the mass, all the particles shall be uniformly in their necessary distributive relation, and particularly to insure that the relatively large pieces of rock shall, throughout the mass, be held, at all points of the surfaces of each, with the necessary cohesion. Prior to my invention builders have aimed to secure this desideratum (in the mixing or commingling of the ingredients) either by manipulating predetermined masses of the several ingredients with shovels, or other hand tools, or by subjecting them to the action of mechanical mixers of one form or another, prior to taking them to the position of ultimate plac-

ing and setting. But experience has shown that the best results in this respect have not been attained. The period of time after the water first comes in contact with the cement is an important factor, the setting or crystallizing beginning instantly upon such contact. And with hand-mixing devices it is impossible to attain the above described desirable and essential, intimate, and uniform mixing of the constituent parts and securing their proper distributive relation, it being well known to engineers that hand-mixed concrete masses have unavoidably incident to them numerous regions of improperly coated rock and of improperly mixed components. It is frequently necessary, and generally practised, to apply by brooms, or equivalent devices, an extra mass of grout-like water and cement before the mixing operation is regarded as completed. And, as concerns the mechanical mixers which handle the ingredients in relatively large masses, it is found that in order to effect the mixing rapidly enough the masses must be discharged before there has been the intimate and uniform commingling that is necessary. The above pointed out difficulties incident to the thorough mixing of the concrete constituents and to the complete coating of the rock pieces with binding material become especially serious when a relatively stiff mixture is made, that is one in which there is little or no excess of water beyond that necessary for causing crystallization. It is more or less common practice to add an excess quantity of water in order to insure at least approximately complete coating of the rock pieces in as short a time as possible. This excess quantity of water not needed for crystallization must of course evaporate before the concrete can reach its final dry condition. One of the important advantages incident to the use of a device embodying my invention is that this undesirable excess of water can be reduced to a minimum or entirely eliminated, satisfactory coating of the rock pieces being found to be possible when the binding material is relatively stiff. While an apparatus embodying my invention is especially well adapted for the handling of a mass of concrete forming elements containing little or no excess of water, it will be understood that its use is not limited to the handling of such a mass. It is equally well adapted for the treating and handling of a mass containing a considerable excess of water in case such an excess is for any reason found desirable. After the imperfect mixing attained in any of these earlier ways which have been mentioned the aim has been to transport the concrete from the place of mixing, (whether by barrows, mechanical conveyers, or other mechanism) to the place of its final deposit in such a way as not to destroy the original distributive relation of the constituent parts of the mass established in the mixer.

I have found that with a mechanism of the sort herein presented a very superior distributing and mixing of the ingredients can be obtained, even where a partially complete work of this sort has been effected preliminary to the introduction of the concrete into the chamber 1. The powerful jets of air or fluid agent are introduced through the pipe 10 as above described in such way as to insure a pressure in the discharge pipe and apply it to the concrete at points where, or near where, it escapes from the main receptacle. This causes the relatively large rock pieces, at the points where they commence their travel in the discharge pipe, to move with considerable violence in the general direction of the pipe toward the place of delivery, insuring that they shall be so agitated or relatively moved in the midst of the binding or cementing material that they shall be uniformly coated or covered with the latter, and, at the same time, the air is delivered in relation to the entire mass in such a way that components are not driven apart, or carried to different distances because of differences in specific gravity. But, while the apparatus which I have shown is adapted for the handling and the delivery in mixed condition of materials not initially mixed at the time of deposit in the chamber 1, I nevertheless do not herein claim as a part of my present invention the method of conveying and simultaneously mixing such initially unmixed materials. This subject-matter is presented and claimed in my co-pending application for mechanism and process for mixing and transporting concrete and similar materials, Serial No. 580,582, filed September 6, 1910. The best results are attained by having the delivery pipe of a relatively large diameter so that there shall be freedom for these relative movements of the rock particles and of the sub-masses that are forcibly impelled ahead of the air jet. The delivery pipe itself becomes a mixing chamber wherein pneumatic mixing is effected or continued, and, if this duct is of a size properly related to the other parts, and to the sizes of the particles of the materials, the latter can be rapidly impelled through it without danger of clogging or choking. The engineer, in any instance, will readily understand what the relative proportions of the parts should be; but I have found that for concrete with, as aforesaid, its masses of relatively large rock pieces, the diameter of the delivering and mixing pipe 13 should be from six to ten inches, the latter generally preferable, this being in contrast with the relatively small delivery tubes frequently used in pneumatic apparatus, and not designed, as described,

to permit such relative motions of large component particles as will insure perfect mixing. This action may be enhanced by providing one or more deflections in the path of the material, causing it, as an entirety, to be broken up, as, for instance, by the bend in the pipe at 14, which, as above described, also slightly checks the advancing mass or sub-masses to assist in preventing the water or other ingredients from separating from the general mass because of difference in specific gravity. All of the features of the invention, however, are not limited to the presence of such bends, as the same results can be attained by other ways now well known to engineers. The path for the material commencing with the points where it is initially introduced into the receptacle 1 and extending to the point of ultimate delivery, is, practically, entirely clear, that is to say, it is at no place provided with positively stopping projections, even at the bends in the delivery pipe, the path at the bends being of the same cross area as at other parts of the pipe; and consequently there are no points where a number of rock pieces can aggregate and choke the duct or commence to form a stoppage.

I am aware that it has been heretofore proposed to employ pneumatic apparatus for conveying each of many materials from point to point. This apparatus has included mechanism for conveying materials like grain and also pneumatic mechanism for transporting materials of a readily flowing or viscous consistency such as "grout", a composition all of whose particles are minute and easily commingled. The pneumatic propelling of these various materials has been effected through discharge pipes of relatively small diameter in which because of the fineness of the particles of material transported there was no danger of clogging, and which were not intended to be used as mixing chambers for the material in transit. None of these forms of mechanisms were found available for the treating of concrete, because of the reasons above explained, and up to the time of my invention no mechanisms for handling concrete were in use.

It will be seen that the receptacle 1 is not only practically unobstructed, as above described, but is so constructed that the material is gradually guided or directed to the large discharge pipe, this guidance being effected by the walls of the receptacle, which join the duct walls with substantial smoothness. This is a matter of great importance where pneumatic pressure is depended on to effect the discharge. The pressure is initially applied over a relatively large top surface and although but a limited part of this pressure surface is effective in driving the material along the discharge tube, (namely, that on a central column of about the same cross area as the discharge tube) the pressure upon the marginal part of the mass top surface acting in conjunction with the converging walls of the conical bottom compels the entire mass to press toward the center and to escape into the pipe with great rapidity and force. And in this respect the mechanism is contradistinguished from those in which discharge pipes are connected with relatively flat wall parts of materials containing receptacles.

Although I have illustrated the apparatus for elevating material, as would be required where concrete is to be delivered to the upper floors of a building under construction, it is apparent that the invention is of advantage for transporting material along a level, as in the construction of bridges, tunnels, etc.

Having described my invention, what I claim and desire to secure by Letters Patent, is:—

1. In combination, a chamber for containing concrete forming materials, a conduit leading therefrom, and having its walls joining the chamber walls with substantial smoothness, and two compressed air inlet pipes connected to the chamber, one of them terminating in a nozzle inside the chamber directed toward the opening into the said conduit and the other pipe opening into the chamber at a point remote from said nozzle.

2. In combination, a chamber for containing concrete forming materials, a conduit leading therefrom, a compressed air inlet pipe connected to a part of the chamber remote from the conduit, and another compressed air inlet pipe leading through the chamber wall and terminating within the chamber near the opening into the conduit in a nozzle directed toward said opening.

3. The method of conducting concrete forming materials through a closed conduit, which consists in introducing the materials in a mass into a chamber connected to said conduit, introducing relatively compressed air behind the whole mass and behind a front portion thereof, and thereby detaching successive portions and driving them from the chamber into the conduit and along the latter.

4. The method of conducting concrete forming materials from a receptacle along a closed conduit connected therewith to the place where it is to be utilized, which consists in closing the receptacle, introducing compressed air behind the mass of materials and also behind the portion thereof lying adjacent the conduit, and thereby pushing the mass into and along the conduit.

5. The herein described method for treating and conveying a relatively compact and impervious mass of concrete forming materials, which consists in violently ejecting

the mass from a chamber into and through a relatively large continuous duct by means of a pressure agent applied behind the mass and a pressure agent introduced into the mass in the general direction of motion thereof at a point along its path.

6. The herein described method of treating and conveying a relatively compact and impervious mass of concrete forming materials which consists in positioning the mass in a chamber connected with an extended outlet passageway, applying air pressure behind the mass within the chamber to force it toward the outlet passageway, and injecting a jet of air under pressure into the mass at an angle to the line of movement of the mass into and through the said passageway.

7. The herein described method of treating and conveying a mass comprising rock, sand, cement and water in concrete forming proportions, which consists in positioning the mass in a chamber having a relatively large cross sectional area and connected with an extended passageway having a smaller cross sectional area, applying to the mass within the chamber air pressure for the purpose of propelling the mass toward and into the said extended passageway, and injecting into the mass at a point adjacent the connection between the chamber and passageway a jet of air so directed as to mingle with the mass and aid its movement along the said passageway.

8. The herein described method of treating and conveying a mass of rock, sand, cement and water in concrete forming proportions, which consists in positioning the mass in a chamber which is connected with a relatively extended passageway, applying air pressure to the mass in the chamber to force it toward and into the passageway in a compact stream, and injecting into the stream at a point along its path, and in the general direction of its movement a jet of air which has a small cross sectional area as compared with that of the stream.

9. The herein described method of treating and conveying a mass of rock, sand, cement and water in concrete forming proportions, which consists in applying air pressure to the mass to eject it from a chamber into a passageway, maintaining the mass in a compact stream as it approaches the entrance to the passageway, and at a point along its path into and through the passageway injecting into the mass a jet of air at an angle to the line of movement along the said path, the cross sectional area of the said jet being small as compared with that of the stream.

10. The herein described method of treating and conveying a mass of rock, sand, cement and water in concrete forming proportions, which consists in positioning the mass in a chamber having a relatively large cross sectional area, applying air pressure to the mass to eject it from the chamber into a relatively extended passageway having a smaller cross sectional area, maintaining the mass in a compact stream as it approaches the entrance of the said passageway, and injecting into the mass at a point adjacent the point of communication between the chamber and the passageway a jet of air for the purpose of aiding the movement of the mass along the passageway, the cross sectional area of the said jet being small as compared with that of the stream.

11. The herein described method of treating and conveying a mass of rock, sand, cement and water in concrete forming proportions, which consists in feeding the mass in a compact stream, and subjecting successive portions of the stream to the action of an air jet so directed as to aid the movement of the successive portions along a relatively extended pathway, the cross sectional area of the said jet being small as compared with the cross sectional area of the stream.

12. The herein described method of treating and conveying a mass of rock, sand, cement and water in concrete forming proportions, which consists in subjecting successive portions of the mass at the bottom of a relatively large mass body to the action of a jet of air so directed as to aid the movement of said portions along an extended pathway.

13. The herein described method of treating and conveying a mass of rock, sand, cement and water in concrete forming proportions, which consists in subjecting successive portions of the mass at the bottom of a relatively large mass body to a jet of air so directed as to aid in causing the movement of the said portions away from the said main mass body and guiding the said portion along a path which, at points adjacent the said jet, is at an angle thereto.

14. The herein described method of treating and conveying a mass of rock, sand, cement and water in concrete forming proportions, which consists in subjecting successive portions of the mass to the action of a jet of air moving at high velocity, and subjecting the main body of the mass to air under pressure for the purpose of advancing the mass gradually into the range of action of the said velocity jet.

15. The herein described method of treating and conveying a mass of rock, sand, cement and water in concrete forming proportions, which consists in subjecting successive portions of the mass to the action of a jet of air moving at high velocity, and subjecting the main body of the mass to pressure for the purpose of advancing the mass gradually into the range of action of the said velocity jet.

16. In a conveyer, a chamber, a receiver, a removable seal between the receiver and the chamber, a discharge pipe connected with said chamber, a pressure pipe connected with the chamber, and a water pipe connected with the chamber.

17. In a device for treating and moving a mass of concrete forming materials, the combination of a chamber for receiving and containing the said mass, a discharge duct connected with the chamber, an air inlet pipe connected with the chamber, means for preventing the flow of air or materials out of the chamber except through the discharge duct, means for supplying air under pressure through the said pipe to the chamber back of the mass of materials therein to push the said mass toward and into the discharge duct, and means for causing a jet of air to impinge upon successive portions of the mass in the general direction of the discharge duct to directly assist their movement therethrough.

18. In a device for treating and moving a mass of concrete forming materials, the combination of a chamber for receiving and containing the said mass, a discharge duct connected with the chamber and extending to a discharge point in a horizontal plane above the chamber, an air inlet pipe connected with the chamber, means for preventing the flow of air or materials out of the chamber except through the discharge duct, means for supplying air under pressure through the said pipe to the chamber back of the mass of materials therein to push the said mass toward and into the discharge duct, and means for causing a jet of air to impinge upon successive portions of the mass in the general direction of the discharge duct to directly assist their movement therethrough.

19. In a device for treating and moving a mass of materials for forming concrete, the combination of a receiver, a removable seal connected with the receiver, a chamber with which the receiver communicates when the seal is removed, a discharge duct connected with the chamber, and having a substantially unbroken inner surface, the said chamber having walls which gradually converge on all sides to the duct and join the duct walls with substantial smoothness, and means for supplying a pressure agent both to the chamber back of a mass of materials therein and to the discharge duct.

20. In a device for treating and delivering materials for forming a concrete mass, the combination of a chamber for the said materials, a relatively large discharge duct having an unobstructed interior and unobstructed communication with the chamber, the chamber having walls which gradually converge on all sides toward the discharge duct, and join the duct walls with substantial smoothness, and means for delivering a pressure agent to the chamber behind the mass of concrete materials therein.

21. In a device for treating and moving a mass of concrete forming materials, the combination of a chamber adapted to receive and contain the said mass, a discharge duct connected with the chamber, the said chamber having walls which gradually converge on all sides to the duct, and join the duct walls with substantial smoothness, means for supplying a fluid pressure agent to the chamber back of a mass of materials contained therein, and means for directing a fluid pressure agent into the discharge duct in the general direction thereof.

22. In a device for treating and moving a mass of ingredients for forming concrete and containing relatively large pieces of material, the combination of a relatively large discharge duct, a pressure chamber for receiving the said ingredients of the concrete mass, said chamber having walls which gradually converge to the discharge duct and join the duct walls with substantial smoothness, the parts being arranged to have pressure exerted upon the material within the discharge duct from the surface of the mass in the chamber on lines extending directly into the discharge duct.

23. In a device for treating and moving a mass of materials for forming concrete, the combination of a receiver, a chamber, a removable seal between the receiver and the chamber, a discharge duct connected with the chamber, the said chamber having walls which gradually converge on all sides to the duct and join the duct walls with substantial smoothness, and means for delivering a pressure agent to the chamber back of a mass of materials therein to assist the movement of the said mass into and through the said discharge duct.

24. In a device for treating and moving a mass of concrete forming materials, the combination of a chamber adapted to receive and contain the said mass, a discharge duct connected with the chamber and extending from it to a discharge point in a horizontal plane above the chamber, and means for directing a pressure agent into the discharge duct in the general direction thereof to engage sub-masses of the materials and aid their movement through the duct to the discharge point.

25. In a device for treating and moving a mass of concrete forming materials, the combination of a receiver, a charge containing chamber connected with the receiver, a removable seal between the receiver and the chamber, a discharge duct connected with the chamber, and means for directing a jet of elastic fluid under pressure into the discharge duct in the general direction thereof to engage succesive portions of the said mass

and their movement into and through the said duct.

26. In a device for treating and moving a mass of concrete forming materials, the combination of a chamber adapted to receive and contain the said mass, a discharge duct connected with the chamber, the said chamber having walls converging to the duct, means for directing a jet of elastic fluid under pressure into the discharge duct in the general direction thereof to engage successive portions of the said mass to aid their movement through the said discharge duct, and means for supplying water to the mass in the chamber as it enters the discharge duct.

27. In a device for treating and delivering a mass of materials for forming concrete, a chamber for the said materials, a discharge duct, the walls of the chamber converging gradually on all sides to the discharge duct and joining the duct walls with substantial smoothness, and the path from the chamber into and through the duct being entirely clear, and means for moving the materials from the receptacle into and through the discharge duct along straight lines extending directly from the chamber into the discharge duct.

28. In a device for treating and delivering a mass of materials for forming concrete, the combination of a chamber, a discharge duct communicating with the chamber, a pipe for delivering a jet of fluid pressure agent for propelling the said concrete materials, a manually controllable valve in the said pipe, the said pipe being arranged with its receiving end outside of the said receptacle and with its delivery end outside of the discharge duct but adapted to deliver the jet of fluid agent to the interior thereof, the interior of the said discharge duct being thus left substantially unobstructed.

29. In a device for the treatment and transportation of concrete forming materials, the combination of a chamber for the said mass, a discharge duct connected with the chamber, the chamber walls joining the duct walls with substantial smoothness, and a means for supplying a jet of fluid pressure agent in the general direction of the duct at a point adjacent its point of connection with the chamber to engage sub-masses of materials to assist their movement through the duct.

30. In a device for treating and delivering a mass of ingredients for forming concrete, the combination of a chamber for receiving and containing the said ingredients of the concrete, a discharge duct connected therewith, the said chamber having walls which gradually converge on all sides to the duct and join the duct walls with substantial smoothness, an air pipe for delivering air or equivalent fluid agent under pressure to the interior of the discharge duct on lines inclined to the longitudinal lines of the discharge pipe and inclined to an axial line of the chamber, and a manually controllable valve in the said air pipe.

31. In a device for treating and transporting concrete forming materials, the combination of a chamber for receiving and containing a mass of the said materials, a discharge duct leading from the chamber, the said chamber having walls which gradually converge on all sides to the duct and join the duct walls with substantial smoothness and the path from the chamber into and through the duct being entirely clear, the duct being provided with a bend at a point adjacent the chamber, and means for directing a jet of fluid pressure agent into the duct along lines cutting the path of materials through the bend thereof to engage sub-masses of the said materials to assist their movement.

32. In a device for the treating and transporting of concrete forming materials, the combination of a chamber for containing a mass of the said materials, a duct leading from the chamber, the chamber having walls which gradually converge on all sides to the duct and join the duct walls with substantial smoothness, thesaid duct being provided with a bend, means for directing a jet of fluid pressure agent into the duct along line cutting the path of materials through the bend thereof to engage sub-masses of the said materials and assist their movement, and additional means tending to cause the movement of the materials from the chamber into the duct.

33. In a device for treating and moving a mass of concrete forming materials, the combination of a chamber adapted to receive and contain the said mass, a discharge duct connected with the chamber, the said chamber having walls converging on all sides to the duct, means for supplying a pressure agent to the chamber back of a mass of materials contained therein, means for directing a pressure agent into the discharge duct, and means for supplying water to the mass in the chamber as it enters the discharge duct.

34. In a device for treating and moving a mass of concrete forming materials, the combination of a chamber adapted to receive and contain the said mass, a discharge duct connected with the chamber, the said chamber having walls which gradually converge on all sides of the duct and join the duct walls with substantial smoothness, manually controllable means for supplying a fluid pressure agent to the chamber back of a mass of materials contained therein, and manually controllable means for directing a fluid pressure agent into the discharge duct in the general direction thereof.

35. In a device for treating and moving a mass of concrete forming materials, the

combination of a chamber adapted to receive and contain the said means, a discharge duct connected with the chamber, the said chamber having walls which gradually converge on all sides of the duct and join the duct walls with substantial smoothness, manually controllable means for supplying a fluid pressure agent to the chamber back of a mass of materials contained therein, and means manually controllable independently of the aforesaid means for directing a fluid pressure agent into the discharge duct in the general direction thereof.

In testimony, that I claim the foregoing as my own I affix my signature, in presence of two witnesses.

JOHN H. McMICHAEL.

Witnesses:
CARL H. KELLER,
M. A. TRACEY.

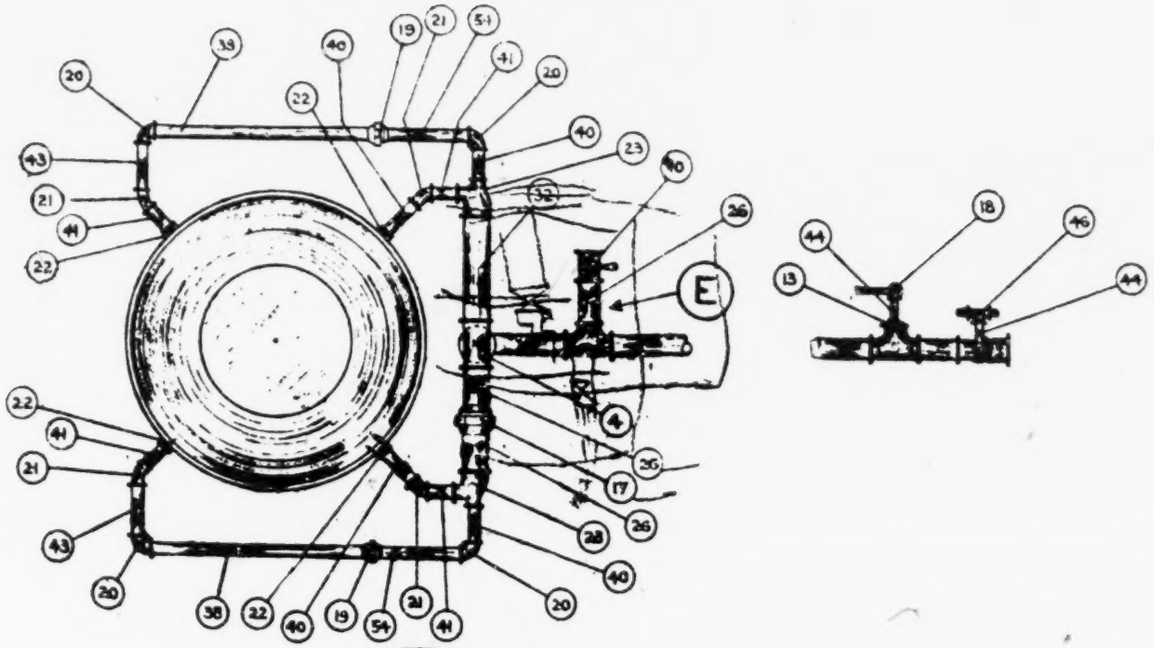
PLAINTIFF'S EXHIBIT No. 3

PLAINTIFF'S EXHIBIT No. 4

ASSEMBLY DRAWING
TYPE "A"
PNEUMATIC MACHINE

PNEUMATIC CONCRETE MACHINERY CO.
NEW YORK

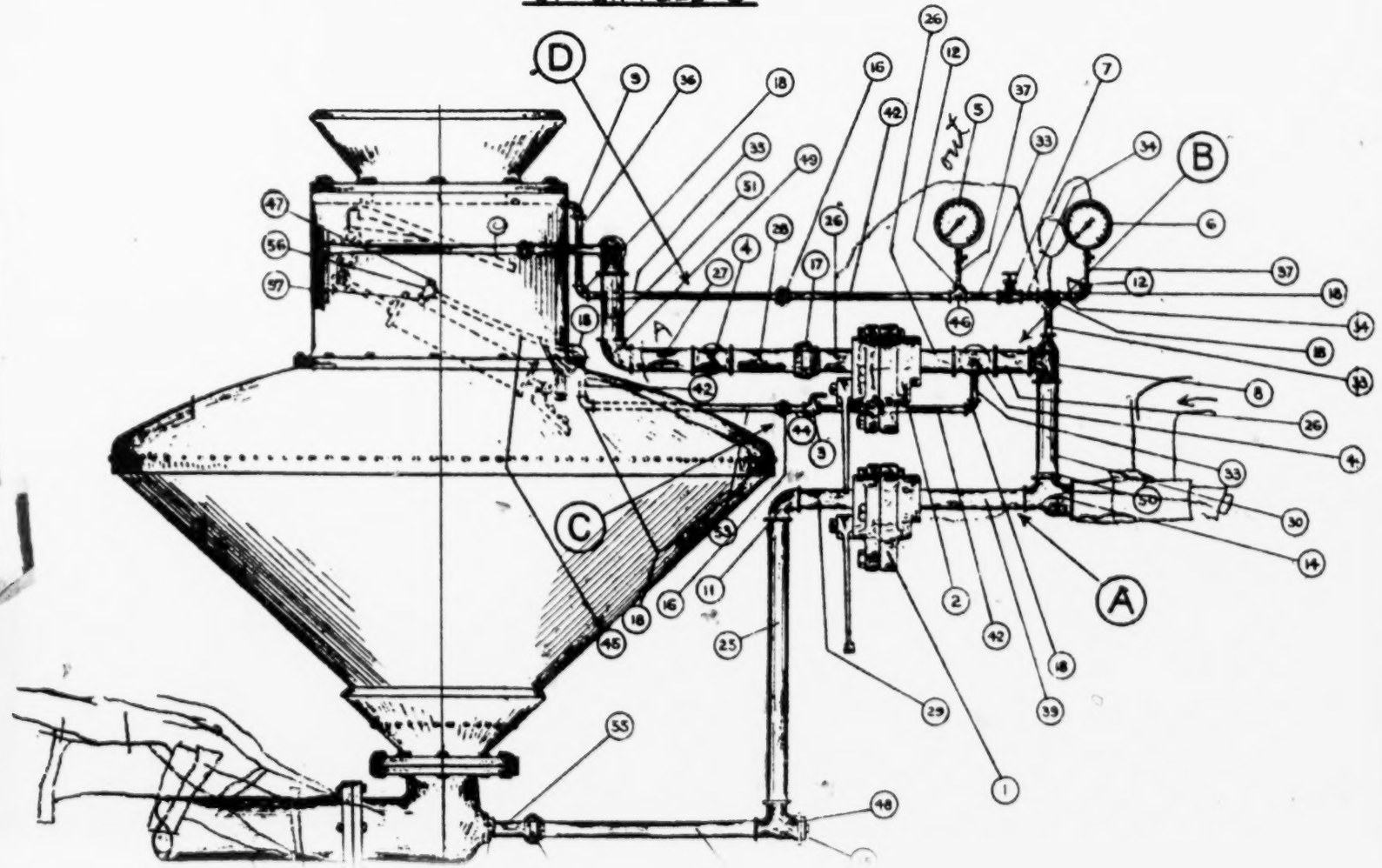
SCALE 1" = 1'-0" CHECKED
DRAWN APP'D
TRACED DATE 5-17-20
PRELIMINARY
REVISED No. PN 40



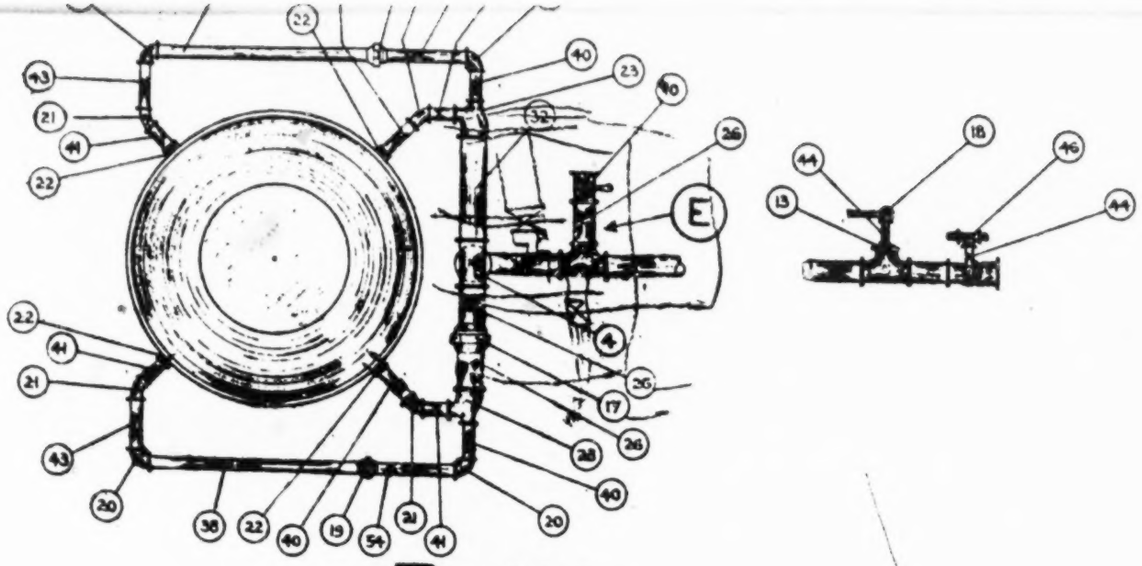
PLAN

SE

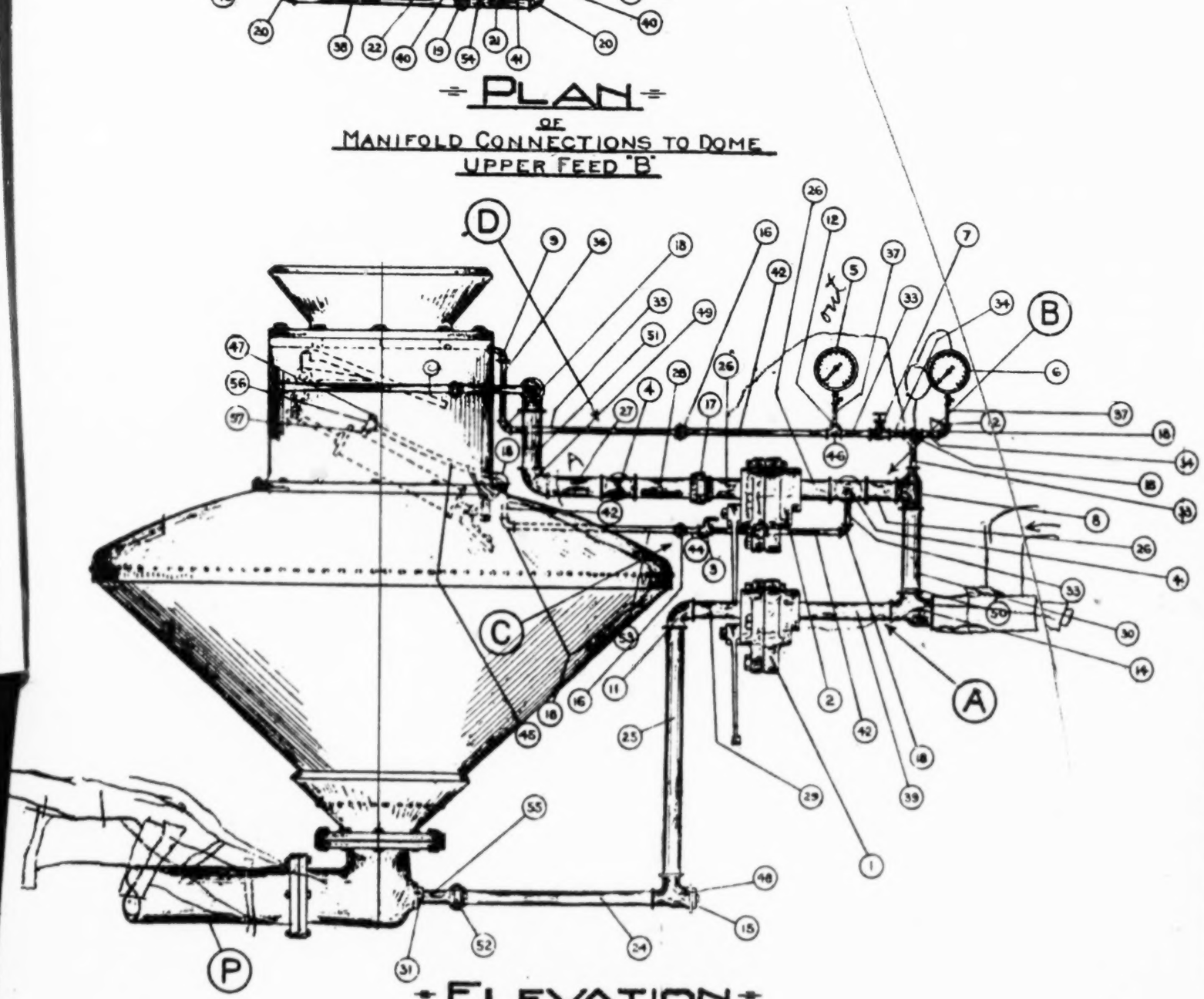
MANIFOLD CONNECTIONS TO DOME
UPPER FEED "B"



No.	Quan.	TYPE
1	1	2" EVERLASTING VALVE
2	1	1½" " "
3	1	½" 3 WAY PLUG COCK
4	3	1½" TEES
5	1	6" PRESSURE GAUGE
6	1	6" " "
7	1	½" GLOBE VALVE
8	1	1½"x½"x1½" TEE
9	1	½" STREET ELBOW
10	1	1½" PLUG COCK
11	1	2" ELBOW
12	2	½"x¼" BUSHINGS
13	1	1½"x½" "
14	1	2"x3"x2" TEE
15	1	2" PLUG
16	2	½" UNIONS
17	2	1½" "
18	7	½" ELBOWS
19	2	¾" UNIONS
20	4	¾" ELBOWS
21	4	¾" 45° "
22	4	1¼"x¾" BUSHINGS
23	2	1½"x¾"x¾" TEES
24	1	2"x21¼" NIPPLE
25	1	2"x27¼" "
26	6	1½"x4" "
27	1	1½"x6⅝" "
28	1	1½"x7¼" "
29	1	2"x5" "
30	1	1½"x10½" "
31	1	2"x2½" BUSHING
32	1	1½"x9¼" NIPPLE
33	2	½"x4" "
34	1	½"x3" "
35	1	½"x20" "
36	1	½"x4" "
37	2	¼" CLOSE "
38	2	¾"x18¼" "
39	1	2"x10½" "
40	2	¾"x3¾" "
41	4	¾"x3¼" "
42	3	½"x4" "
43	2	¾"x4¾" "
44	3	½" CLOSE "
45	1	¼"x18" RUBBER HOSE (4 CLAMPS FOR SAME
46	2	½" TEES
47	1	⅜" PLUG
48	1	2" TEE
49	1	1½" ELBOW
50	1	2"x1½" BUSHING
51	1	1½"x6" NIPPLE
52	1	2" UNION
53	1	½"x18" NIPPLE
54	2	¾"x6¾" "
55	1	2"x4" "



PLAN
OF
MANIFOLD CONNECTIONS TO DOME
UPPER FEED "B"



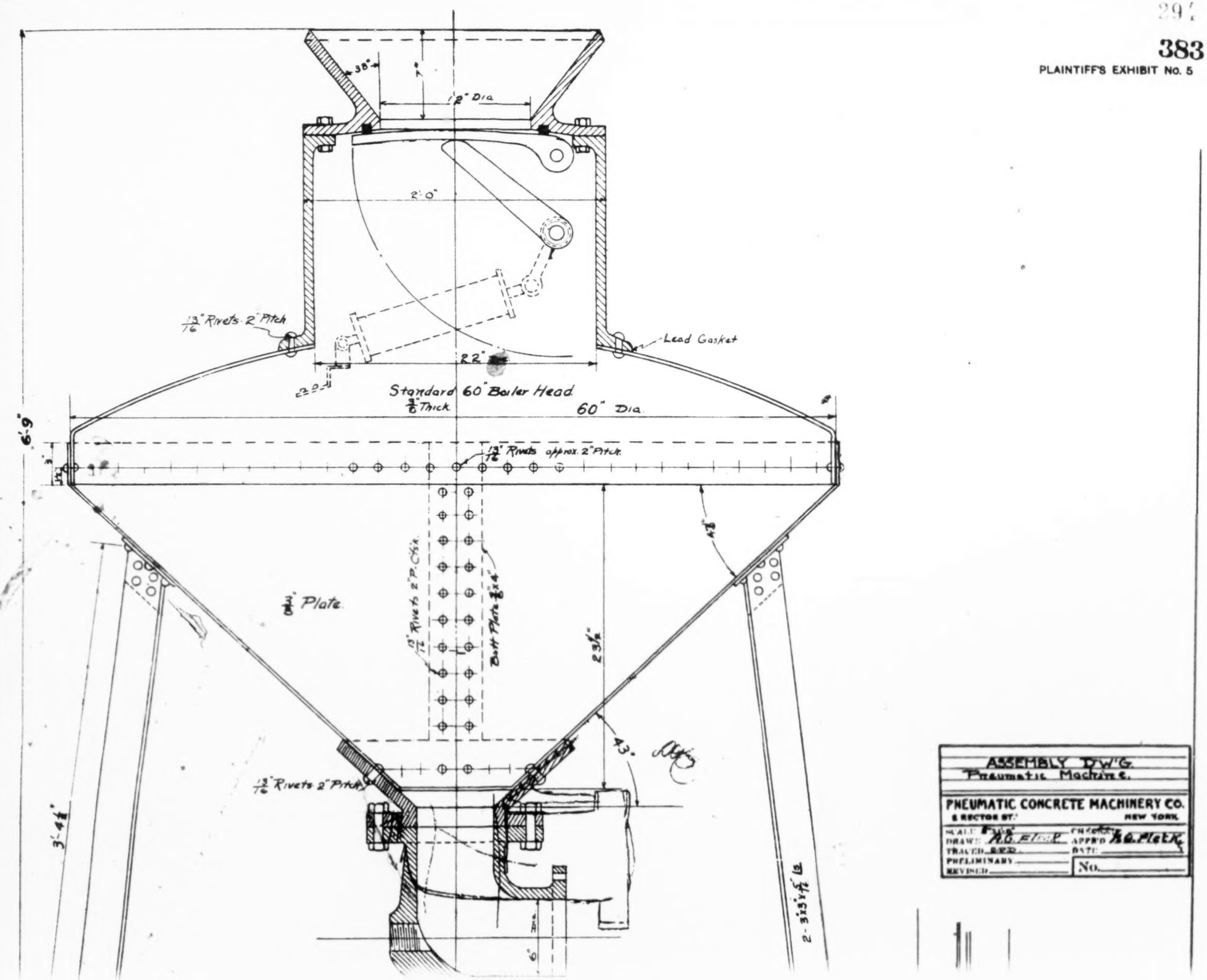
ELEVATION

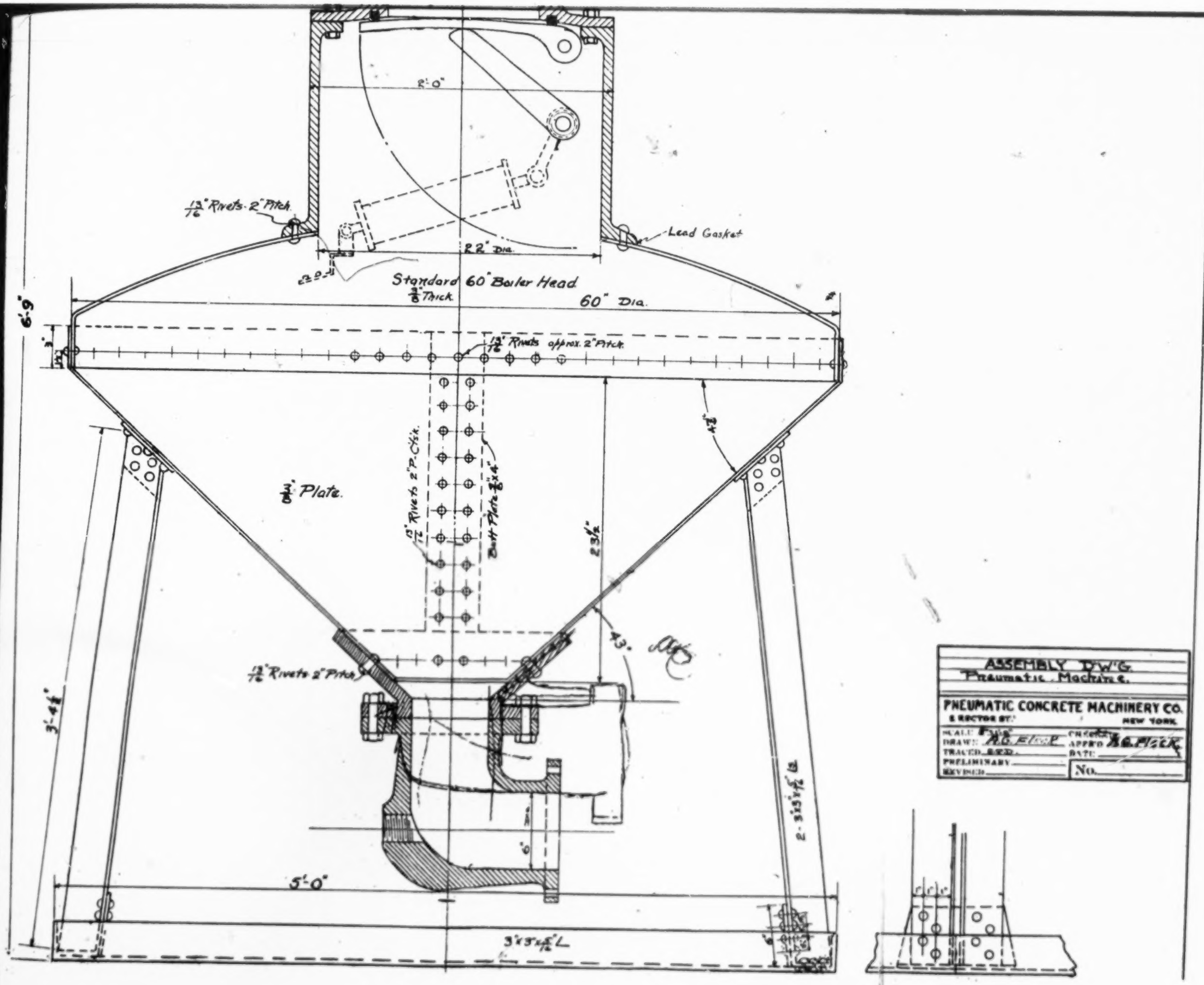
ASSEMBLY DRAWING
TYPE "A"
PNEUMATIC MACHINE

PNEUMATIC CONCRETE MACHINERY CO.
NEW YORK

SCALE 1" = 1'-0" CHECKED
DRAWN APPR'D
TRACED DATE 5-17-20
PRELIMINARY
REVISED
No. PN 40

No.	Quantity	Type
1	1	2" Everlasting Valve
2	1	1½" " "
3	1	½" 3 Way Plug Cock
4	3	1½" Tees
5	1	6" Pressure Gauge
6	1	6" " "
7	1	½" Globe Valve
8	1	1½"x½"x1½" Tee
9	1	½" Street Elbow
10	1	1½" Plug Cock
11	1	2" Elbow
12	2	½"x¼" Bushings
13	1	1½"x½" "
14	1	2"x3"x2" Tee
15	1	2" Plug
16	2	½" Unions
17	2	1½" "
18	7	½" Elbows
19	2	¾" Unions
20	4	¾" Elbows
21	4	¾" 45° "
22	4	1¼"x¾" Bushings
23	2	1½"x¾"x¾" Tees
24	1	2"x21¼" Nipple
25	1	2"x27¼" "
26	6	1½"x4" "
27	1	1½"x6⅝" "
28	1	1½"x7¼" "
29	1	2"x5" "
30	1	1½"x10½" "
31	1	2"x2½" Bushing
32	1	1½"x9¼" Nipple
33	2	½"x4" "
34	1	½"x3" "
35	1	½"x20" "
36	1	½"x4" "
37	2	¼" Close "
38	2	¾"x18¼" "
39	1	2"x10½" "
40	2	¾"x3¾" "
41	4	¾"x3¼" "
42	3	½"x4" "
43	2	¾"x4¾" "
44	3	½" Close "
45	1	¾"x18" Rubber Hose (4 Clamps for Same)
46	2	½" Tees
47	1	⅜" Plug
48	1	2" Tee
49	1	1½" Elbow
50	1	2"x1½" Bushing
51	1	1½"x6" Nipple
52	1	2" Union
53	1	½"x18" Nipple
54	2	¾"x6¾" "
55	1	2"x4" "
56	1	⅜"x⅜"x½" Tee
57	1	⅜" Close Nipple


38"
7"
12" Dia
2'-0"
13/16" Rivets 2" Pitch
Lead Gasket
22"
Standard 60" Boiler Head
3/8" Thick
60" Dia
6'-9"
13/16" Rivets approx. 2" Pitch
3/8" Plate
13/16" Rivets 2" P. Ctrs.
Butt Plate 3/8"x4"
23 1/2"
43°
13/16" Rivets 2" Pitch
3'-4 1/2"
2-3"x3"x5/16" Ls
6"
ASSEMBLY DW'G.
Pneumatic Machine.
PNEUMATIC CONCRETE MACHINERY CO.
2 RECTOR ST.
NEW YORK
SCALE
DRAWN
TRACED
PRELIMINARY
REVISED
CHECKED
APPR'D
DATE
No.



2'-0"
13/16" Rivets 2" Pitch
Lead Gasket
22" Dia.
Standard 60" Boiler Head
3/8" Thick
60" Dia.
6'-9"
13/16" Rivets approx. 2" Pitch
3/8" Plate
13/16" Rivets 2" P. Ctsk.
Butt Plate 3/8"x4"
23 1/2"
43°
13/16" Rivets 2" Pitch
3'-4 1/2"
5'-0"
3"x3"x5/16" L
2-3"x3"x5/16" L
ASSEMBLY D'W'G.
Pneumatic Machine.
PNEUMATIC CONCRETE MACHINERY CO.
2 RECTOR ST.
NEW YORK
SCALE
DRAWN
TRACED
PRELIMINARY
REVISED
CHECKED
APPR'D
DATE
No.

[fol. 384] PLAINTIFF'S EXHIBIT No. 19

(P. 13)

Item 6. For concrete masonry, in place, the sum of nineteen and 00/100 dollars ($19.00) per cubic yard.

Item 6-S. For rubbing to a smooth finish the surface of concrete as required by Section No. 175, the sum of Fifteen cents ($0.15) per square foot.

Item 7. For protective concrete masonry, in place, outside of waterproofing, the sum of Fifteen and 55/100 dollars ($15.55) per cubic yard.

Item 8. For rubble stone masonry, in place, the sum of Nine and 45/100 ($9.45) dollars per cubic yard.

Item 8-A. For dry rubble masonry, in place, the sum of Nine and 00/100 dollars ($9.00) per cubic yard.

Item 9. For brick masonry, in place, the sum of Thirty-nine and 00/100 dollars ($39.00) per cubic yard.

Item 10. For hollow terra cotta brick or tile masonry of any thickness, in place, the sum of thirty-six and 00/100 dollars ($36.00) per cubic yard.

Item 10-A. For four and one-half (4½) inch by thirteen (13) inch terra cotta flue lining, in place, the sum of One and 50/100 dollars ($1.50) per lineal foot of flue.

Item 11. For grout of Portland cement, the sum of Six and 00/100 dollars ($6.00) per barrel of Portland cement used.

[fol. 385] (Pp. 102 and 103)

160. One barrel of cement shall consist of four bags, each bag containing 94 pounds net of cement, and 94 pounds of cement shall be estimated at 0.875 cubic foot of volume.

For the purpose of measuring and mixing ingredients for concrete the unit of volume shall be 0.875 cubic foot.

Each and every batch of concrete mixed shall contain one unit of volume of cement, or multiples thereof.

Fine and coarse aggregates shall be measured separately on the work before mixing. No mixture of course and fine aggregates will be permitted to be delivered to the Works.

The proportion of coarse and fine aggregates shall be measured by volume as cast into the measuring boxes, and struck measures shall be used. The Contractor shall pro-

vide separate, strong, substantial measuring boxes, approved by the Engineer, the capacities of which shall be in the specified proportion to the volume of cement as defined above, and such boxes shall be used for each and every batch.

The volume of water used in concrete shall be exactly gauged for each and every batch, and the Contractor shall provide approved accurate measuring and controlling devices therefor. The concrete shall be of a plastic consistency, the amount of water to be used shall be determined by the Engineer.

161. Whenever practicable, concrete shall be machine mixed. A rotary machine of a pattern approved by the Engineer, and mixing only one batch at a time, shall be [fol. 386] used. The time of mixing each batch of concrete after all the ingredients are in the mixer shall be determined by the Engineer for each type of machine, but the minimum time for any type of machine shall be (1) one minute. Concrete shall not be mixed on the surface of the street or decking on the line of the work, unless specifically permitted, but the mixing shall be done as close as practicable to the work so as to avoid too great a lapse of time between the mixing and placing of the concrete in the forms.

162. When concrete is mixed by hand the coarse aggregate shall be spread on a platform in a bed about six (6) inches thick, and shall be thoroughly wet. Fine aggregate shall be spread on a platform and the cement spread on the fine aggregate. After thoroughly mixing the cement and fine aggregate, the dry mixture thus formed shall be spread evenly over the bed of coarse aggregate wet as above, and the whole turned over until thoroughly mixed, but not less than four (4) turnings on the mixing board will be allowed in any case, water being added gradually. Care shall be taken to keep the bed of concrete wet and avoid piling.

163. Concrete shall be placed immediately after mixing, in layers of such thickness as may be directed by the Engineer and shall be thoroughly compacted throughout the mass by ramming or spading, special tamping bars or tools being used as approved by the Engineer. If a small amount of water has been used in mixing, ramming shall be continued until the water flushes to the surface.

UNITED STATES PATENT OFFICE.

WILLIAM HARROLD SMITH, OF NEW YORK, N. Y.

IMPROVEMENT IN CONCRETE PAVEMENTS.

Specification forming part of Letters Patent No. 122,497, dated January 2, 1872.

To all whom it may concern:

Be it known that I, WILLIAM HARROLD SMITH, of the city, county, and State of New York, have made new and useful Improvements in Concrete for Pavements and other purposes; and I do hereby declare the following to be a full, clear, and exact description of the same.

In an application filed by me contemporaneously herewith for Letters Patent of the United States I have described certain improved machinery and appliances for manufacturing and mixing concretes for pavements, buildings, and other purposes, conveying it from the machine to the place where it is to be laid or used, and suitably laying or casting it in molds or otherwise to the required form. By reference to the specification filed therewith it will appear that such apparatus is specially adapted to the manufacture and use of a liquid or semi-liquid concrete composition which can be conveyed through pipes and cast in molds. No concrete composition has ever been brought into public use for the purposes referred to which is capable of being thus manipulated; nor has it been deemed practicable to attempt to invent a composition sufficiently liquid to flow freely through pipes and yet able to set quickly upon reaching its destination, so as to form in a very short time a solid mass of artificial stone. Such a composition, however, I have discovered, and have proved, by a thorough course of experiments and trials, its complete fitness for the purposes and the great practical utility of its application in the manner referred to. So far, therefore, as relates to this division of the subject-matter contained in my several applications for Letters Patent, my invention consists in a composition prepared substantially as hereinafter described, so as to be capable of use in a fluid or semi-fluid condition, for the purposes specified.

I take any good hydraulic cement, preferably Portland cement, and sand, gravel, or some equivalent of sand or gravel, such as broken shells, slag, etc., and mix them together in about equal proportions by specific weight. This mixing may be accomplished by any suitable means, but preferably by the machine described in my other application above referred to. To the mixture of cement and sand, in the proportion of two parts, by weight, I add three parts, by weight, of broken stone, using therefor any of the varieties of stone suitable for the purpose, such as blue-stone, quartz, the ordinary cobble-stones employed for paving purposes, granite, &c. I then add a quantity of water equal to about three-fifths of the entire mass of materials already commingled, and agitate the mixture thoroughly by mechanical means until the whole is of a fluid character, capable of flowing freely through pipes and of being run into covered molds. It is then ready for use.

It will be seen from what I have stated that the materials employed by me in making this improved composition are old, every one of them having been used for many years. My invention does not consist in being the first to combine such materials, but in being the first to combine them for the arts in such proportions that a liquid or semi-liquid mass results which can be flowed through pipes and run into covered molds, and which can be made and used in laying pavements, building houses and other structures, etc., by means of the improved machinery described in my said accompanying application.

I do not claim to cover a pasty mass which can be pressed into blocks but which will not flow through pipes, the great practical advantage of my improvement being the adaptation of the material to a new method of conveying and laying it for the purposes set forth.

The proportions above stated may be varied within certain limits without departing from the spirit of my invention. However they may be varied, so long as the result is a composition which will flow through pipes or run into molds, it comes within the scope of my claims. Indeed, with certain species of stone of different specific gravities, the proportions of sand, water, and cement must necessarily be slightly varied. The heavier the stone the more dense must be the surrounding liquid in order to sustain it. The broken stone must be held uniformly diffused throughout the mass, and the liquid, while thin enough to flow even with the stones intermingled, must be thick enough or have tenacity enough to keep the stones from

settling to the bottom. In the perfect adjustment of these conditions consists the great secret of my success.

So far as concerns the process of laying pavements and building up walls by carrying the materials in a liquid form in tubes and discharging it therefrom into molds which keep it in the required position until it is set, such process is claimed in my contemporaneous application and constitutes no part of this. Such process is applicable to all compositions, however made and whether yet discovered or not, that can be conveyed in pipes.

Having thus described my invention, what I claim is—

The paving or building composition herein described, when prepared for use in a liquid or semi-liquid condition, capable of flowing in pipes and running into molds, substantially as described.

W. HARROLD SMITH.

Witnesses:
NATHAN K. ELLSWORTH,
MELVILLE CHURCH. (110)

(40.)

3 Sheets--Sheet 1.

W. H. SMITH.

Improvement in the Manufacture of Concrete Pavement and Machinery for same.

No. 122,498. Patented Jan. 2, 1872.

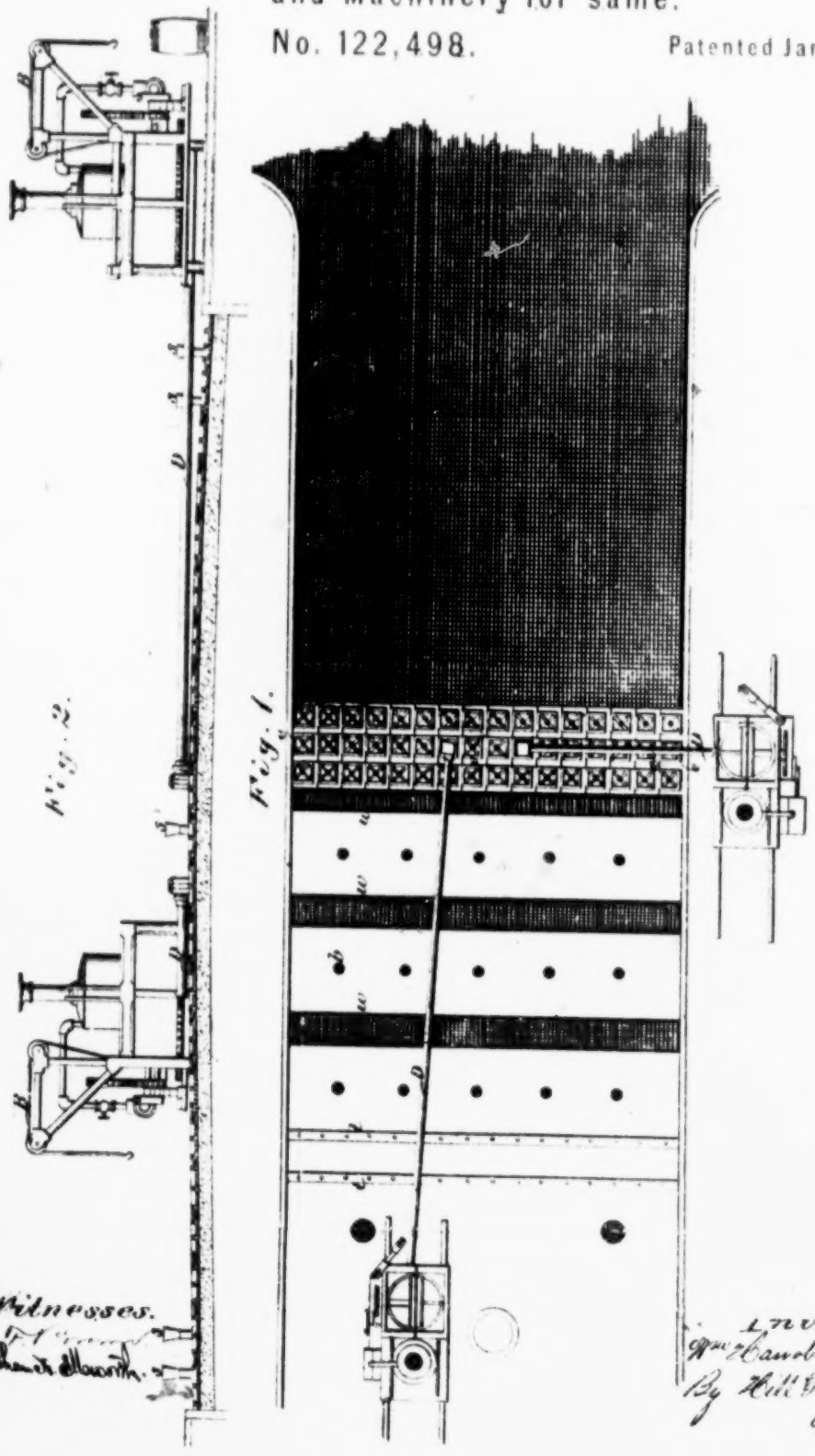


Fig. 1.

Fig. 2.

Witnesses.

Inventor
Wm. Harold Smith
By Hill & Ellsworth
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3 Sheets--Sheet 2.

W. H. SMITH.

Improvement in the Manufacture of Concrete Pavement and Machinery for same.

No. 122,498. Patented Jan. 2, 1872.

Fig. 3.

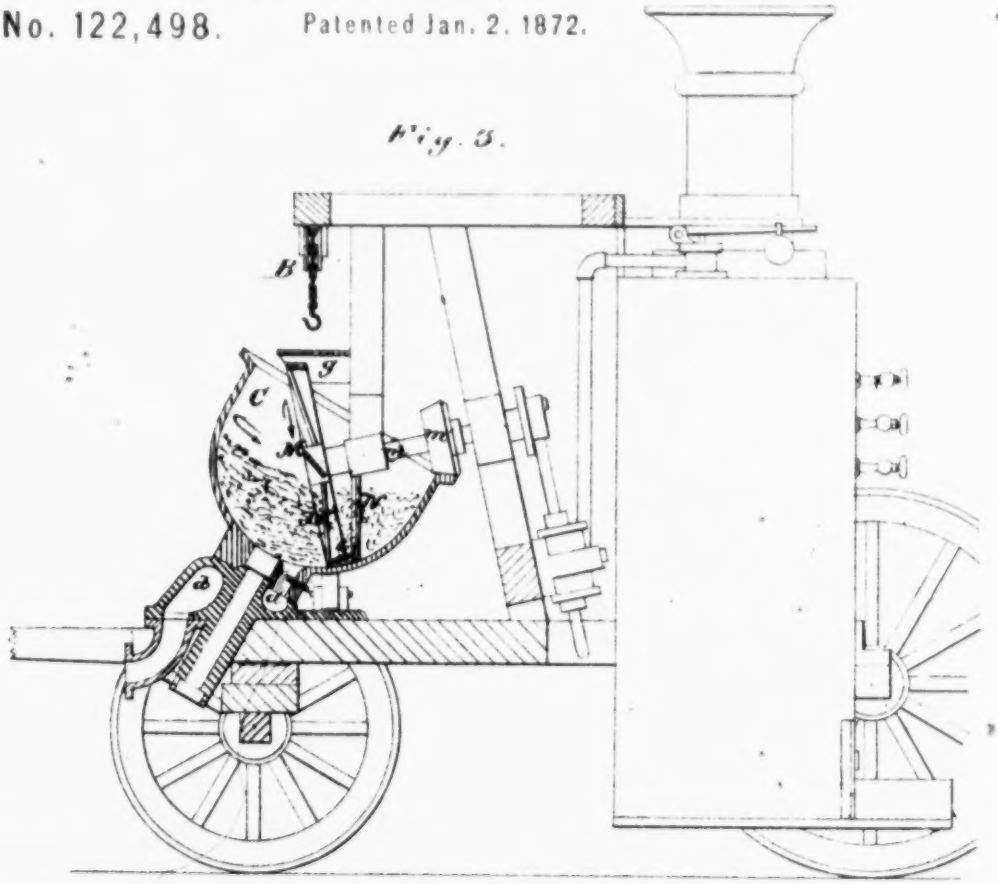
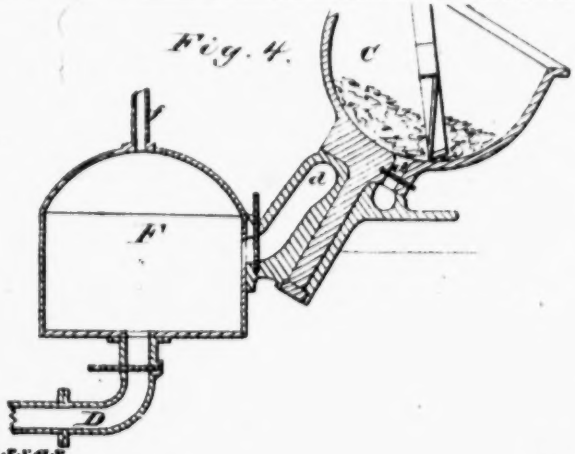


Fig. 4.



Witnesses.

Nathan R. Ellsworth.

Inventor.

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(40.) 3 Sheets--Sheet 3.

W. H. SMITH.

Improvement in the Manufacture of Concrete Pavement and Machinery for same.

No. 122,498. Patented Jan. 2, 1872.

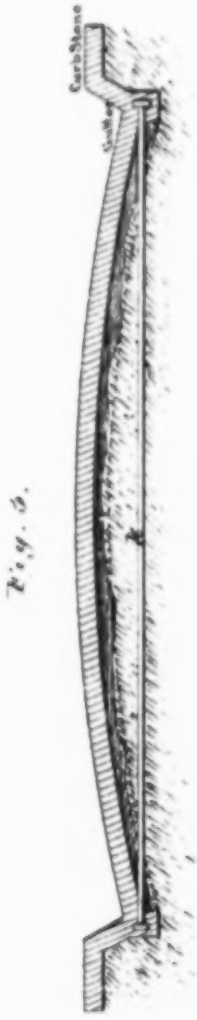


Fig. 5.

Fig. 6.

Witnesses.
C. F. Brown
Richard K. Ellsworth.

Inventor:
W. Harold Smith
By Hill & Ellsworth
Attys.

UNITED STATES PATENT OFFICE.

WILLIAM HARROLD SMITH, OF NEW YORK, N. Y.

IMPROVEMENT IN THE MANUFACTURE OF CONCRETE PAVEMENTS AND IN MACHINERY FOR THE SAME.

Specification forming part of Letters Patent No. 122,498, dated January 2, 1872.

To all whom it may concern:

Be it known that I, WILLIAM HARROLD SMITH, of the city, county, and State of New York, have invented certain new and useful Improvements in the Manufacture of Concrete Pavements and Machinery for the same; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, in which—

Figure 1 is a plan. Fig. 2 is a vertical transverse section. Fig. 3 is a side elevation of the machine, showing a part in section. Fig. 4 is a detached sectional view of the mixing-vessel, forcing-vessel, &c. Fig. 5 is a cross-section of the street and pavement; and Fig. 6 is a longitudinal section, showing a modification of the pavement.

Similar letters of reference indicate the same parts.

The object of this invention is to provide for the public an improved street-pavement, an improved method of laying the same, and improved means for carrying said method into practice. To this end the invention consists in the improved machinery and appliances hereinafter described, and in the improved method of constructing pavements and other structures by the use of such machinery and appliance, substantially as hereinafter set forth.

A distinctive feature in my method of laying pavements consists in manufacturing the concrete composition in a fluid or semi-fluid state, so that it will flow through pipes, and in conveying it from the mixing-machine to the spot where it is to be laid, in pipes or conduits and flowing it from the pipes upon the ground, or upon a suitable foundation, where it immediately sets and forms the pavement, its surface being molded to any desired conformation by means of surface molds.

In thus constructing a pavement I preferably use the composition described in an application for Letters Patent of the United States filed by me contemporaneously herewith; but in my improved process or method of laying pavements as herein described, I do not confine myself to that particular composition, but propose to use any composition whatever, now known or hereafter to be discovered, the properties of which adapt it to be conveyed and laid while in a fluid state.

In preparing and laying my improved composition above referred to, I make use of machinery and other appliances, which I will now proceed to describe.

In the first place, for the purpose of thoroughly mixing the materials and conveying them in a fluid state to the spot where they are to be laid, I employ a portable machine, operated preferably by steam-power, said machine being moved along from time to time either by hand or its own motive power as the work progresses. The machine is provided with a rotary mixing-vessel, C, with a crane or other suitable hoisting apparatus, B, which dumps the materials into the mixing-vessel, with a series of grinding and mixing disks, and wheels M N working within the mixing-vessel, with adjustable and movable pipes or conduits D, through which the liquid concrete composition is conveyed from the machine to the street; and also, if preferred, with forcing apparatus, F, which forces the fluid into and through the pipes to its destination, the mixing-vessel being rotated by a friction-wheel, *m'*, upon the shaft *m* of the stirring-wheel, which shaft is driven by a crank and pinion, or other suitable means, operated by the power of the engine. The fixed disks N and rotary stirrers M M are inclined to each other, as shown in Fig. 3, so as to more thoroughly mix the contents of the vessel. The liquid composition, after it has been thoroughly mixed with the pebbles, gravel, or broken stone, flows off from the mixer through passages *d*, provided with suitable valves, into the pipe D, which delivers it wherever it is required for use. When it is necessary to force the liquid up hill, or to convey it quickly or in larger quantities than usual, or through long pipes, or to press it in the mold and expel the air therein, in which it might begin to stiffen before reaching its destination, I employ a forcing apparatus to propel it through the pipes, the same consisting, preferably, of a tight chamber, F, capable of resisting great pressure, into which the liquid flows from the mixer, and a pipe, *f*, by which steam or compressed air can be introduced into the chamber F, upon the liquid, to force the latter, by pressure, into the pipe D. Any other species of forcing apparatus may, however, be substituted, if preferred. A guard or shield, *g*, is attached to the standard which supports the plate N, to

prevent the stirring-wheel from throwing out the liquid when in rapid motion.

Any form of steam-engine, and any construction of propelling apparatus may be used, which will answer the purpose, and the engine may be combined with or set up independent of the machine, and connected to it when in operation by belts, gear-wheels, or other suitable means. The pipe D may be jointed or flexible, to adapt it to be lengthened or shortened, or moved in any desired direction.

By reference to my application for Letters Patent upon the composition which I prefer to employ with this machine, it will be observed that the constituent elements of such composition are cement, sand, water, and gravel, or broken stones. In preparing such composition I place the cement and sand in the mixer, in suitable proportions, and add the water and the broken stones, the apparatus being either in motion or not, as preferred. If not in motion I start it up and run it till the cement and water have become liquid, and the sand and broken stones thoroughly and uniformly mixed therewith. I then open the valves and let it flow off through the pipe D. New materials may be continuously fed to the machine while it is in operation, or the mixing-vessel may be successively filled and emptied, as the manufacturer may prefer.

In laying pavements by means of this improved process and mechanism, where the ground or other foundation is level, it may not be necessary to use surface-molds, as the composition is sufficiently liquid to settle to a perfectly level surface, but where the street is "crowning," or the structure is to be molded to any particular form, surface-molds must, of course, be employed. These molds may be of any suitable structure, and may impress upon the surface of the pavement any desired configuration or design, from the simply-roughened or corrugated surface, shown in Fig. 1, up to the most elaborate patterns that the fancy may suggest.

My method of laying the pavement is preferably as follows, but can, of course, be altered as circumstances may require. First, having removed the old cobble-stones, or other material constituting the old pavement, and leveled the street down to the required grade, I place suitable side molds, *t t*, across the street, and run the liquid between them. It soon sets and forms parallel ribs or walls *w w*. I then place blocks *b b*, preferably of the solidified concrete, at suitable intervals between the walls *w* to assist in supporting the surface-molds, after which the latter are placed, as shown at *e e*, suitable sinking-heads, *s s*, being provided to compensate for the shrinkage of the material in setting. I then connect the pipes D D to the molds and run in the liquid composition, the molds being held down by weights, if necessary. The gutters, curb-stones, and side-walks may all be made at the same time, in one continuous piece with the center of the street, if preferred. In a few minutes after the molds have been filled the liquid will have set sufficiently to allow them to be taken up and advanced to the space between the next two walls, and so on until the whole is laid. Of course removable side molds or bulk-heads may be employed in place of the concrete walls *w w*. The pavement constructed by this process may be of any suitable thickness. Where the ground is soft or there are bad places, liable to settle, it may be made twelve inches or more in thickness, so that when complete it will stand like an arch of solid masonry, entirely independent of any local subsidence of the foundation. When built for this purpose chords or girders *k k* may be embedded in the composition, to operate in lieu of abutments to the arch, or may may be extended across the street under the pavement, as shown in Fig. 5, in which case it may be desirable to protect them from decomposition. So, too, the pavement may be laid upon any kind of foundation, and the foundation may rest flat upon the ground, or be supported above it upon piles, sills, blocks, or other sub-structure, in any manner that may be preferred. They may be protected from decomposition by means of a coating of concrete applied to them, as shown in my former patent, for protecting piles. So, too, the pavement may be cast with supporting ribs on the under side, as shown in Fig. 6.

Suitable provision may be made for the subsequent removal of sections of the stone concrete whenever it may be necessary to get at the water or gas-pipes for the purpose of repairing them, or to get to the ground beneath for any purpose whatever. Spaces may be left unfilled by the concrete and be afterward so filled in that the stones or blocks may be taken out independently of the rest of the pavement. In filling in such spaces a softer material may be used, which can be easily cut out or otherwise removed, or the hard material, if used, may be separated from the surrounding pavement by a thin partition of softer material by strips of wood, or by anything else that will allow the blocks to come out readily, and to give it the required degree of elasticity. If no provision should be made for the purpose blocks can be easily cut out anywhere by means of the newly-invented sand-blast apparatus, or by a saw or other device. To facilitate the cutting out of such blocks strips of wood, or other soft substance, may be embedded in the surface of the pavement, if preferred, to prevent the horses from slipping, though there will be no appreciable danger from such cause, as I design using stones of different degrees of hardness, in order that they may wear unequally, and cause the pavement always to present a rough surface.

A stone-breaking apparatus of any pattern may be used with the mixing machine, and be driven by the same engine, both machines being combined in one, if preferred. With such apparatus, when relaying pavements, I take up the old cobble stones as the work advances, break them up, feed them to the mixing-ma-

chine, and lay them down again in the new pavement a few yards in rear, thereby saving all expense of transportation and effecting an immense reduction in the cost of the materials, beside obviating the necessity of having large tracts of the old pavement up at the same time. In laying the pavement in streets where street-railways are in operation, beds may be cast in the surface of the pavement to receive the rails.

Having thus described my invention, what I claim is—

1. The process of laying concrete pavements by flowing the liquid material upon the bed of the street, substantially as described.

2. The combination of the mixing-vessel with stirring mechanism, and with pipes or conduits to convey the mixed material from the vessel to the street, when adapted to the construction of pavements, substantially as described.

3. The compressing apparatus F, in combination with the mixer, and the pipes or conduits, substantially as and for the purposes described.

4. The portable machine herein described, combining a mixing-vessel, stirring mechanism, and apparatus for operating the same, substantially as described.

5. The surface-molds *e e*, in combination with the conveying pipes or conduits, and the mixing and forcing apparatus herein described, when adapted to the laying of street-pavements with liquid material, substantially as set forth.

W. HARROLD SMITH.

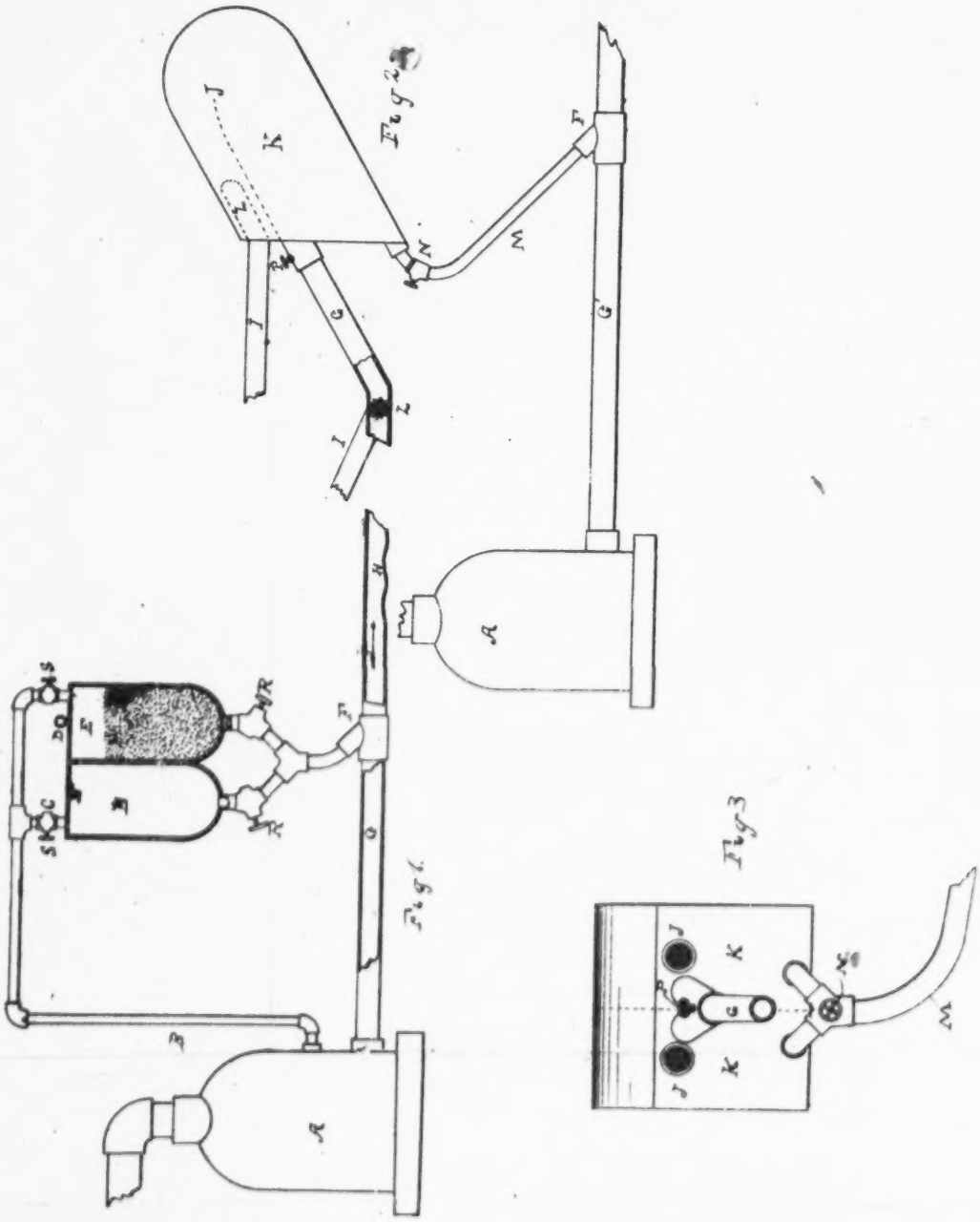
Witnesses:
H. K. ELLSWORTH,
MELLVILLE CHURCH. (110)

(No Model.)

J. W. BEACH.

PNEUMATIC CONVEYER.

No. 267,318. Patented Nov. 14, 1882.



WITNESSES—
F. W. Adams
Jesse Cox, Jr

INVENTOR—
James W. Beach.

UNITED STATES PATENT OFFICE.

JAMES W. BEACH, OF CHICAGO, ILLINOIS.

PNEUMATIC CONVEYER.

SPECIFICATION forming part of Letters Patent No. 267,318, dated November 14, 1882.

Application filed April 17, 1882. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. BEACH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Pneumatic Conveyer, of which the following is a specification.

My invention relates to pneumatic transportation; and the objects of my improvement are to provide a continuous current of air passing through a tube, pipe, or box at great velocity, into which current of moving air the article or matter to be transported or conveyed is, in limited quantities, continuously projected or impelled, and also to transmit such article or matter through the tube while in a state of suspension in the air in the tube, and without contact with the sides or bottom of the tube. I attain these objects by the mechanism illustrated in the accompanying drawings.

Figure 1 is a vertical section of a part of the entire machine or apparatus. Fig. 2 is a vertical section of a part of the machine, being the exhaust apparatus, receiver, and discharge and "helper;" Figs. 1 and 2, a vertical section of the entire machine. Fig. 3 is a vertical section of the receivers, switch, and discharge apparatus.

Similar letters refer to similar parts throughout the several views.

A is a reservoir filled with air either by free communication with the surrounding atmosphere at its natural pressure or with air condensed to any degree of elasticity required and kept at a constant equal pressure.

G is a pipe, tube, or box, an open end of which is inserted in the reservoir A, so as to receive the air from the reservoir.

E E are bins or receptacles, into which the articles or commodity to be transported is run or placed through the opening and valve D.

R R are valves or switches, so arranged as to allow communication with one of the bins or receptacles and the pipe G to be cut off while the other bin is being filled.

B is a pipe leading from the reservoir to the bins communicating therewith, and subject to be closed by the valves *s s*.

F is a pipe communicating between the bins E E and the pipe G. The foregoing is included in Fig. 1.

I I, Fig. 2, are exhaust-pipes having their inner ends inclosed or covered (protected) with suitable bars, slats, or screens.

J is a continuation (curved) of the upper half only of the pipe G, projecting into the receiver K.

K K are two receivers, into one of which the commodity in course of transportation is received, from which receiver the air is to be exhausted, or kept as nearly exhausted as is practicable, through the exhaust-pipes by means of suitable exhaust apparatus.

P is a valve or switch by means of which communication between the pipe G and one of the receivers is cut off, and at the same time such communication with the other receiver is opened.

N is a switch or valve by means of which communication between one of the receivers and the pipe M is cut off, and at the same time communication between the other receiver and said pipe is established.

M is a pipe for the common use of the two receivers, and communicating between the pipe G and the two receivers through the switch or valve N.

I I, Fig. 3, are respectively exhaust-pipes, with screens.

P is a switch or valve; K K, receivers; N, a valve or switch.

M is a discharge-pipe leading to helper, by means of which "helper," so-called, a new impetus is given to the article or commodity to be transported.

H, Fig. 1, is the wavy or undulating interior of the pipe G, at a distance from the point F, and made by suitable indentations or elevations, or both, of the surface of the pipe, so as to constitute on the interior of the same a wavy or undulating surface; or may be wholly inside of the pipe, the object being to create an upward current or trend to the air as it rushes through the tube over the undulating or through the undulating interior surface thereof.

The manner of constructing and operating the machine and apparatus may be briefly described as follows:

A strong air-tight reservoir, A, Fig. 1, is constructed at one end of the pipe G. At the other end of the same pipe one or more strong air-

tight receptacles or receivers are constructed. Communicating between the reservoir and receivers is a pipe, G, or tube, air-tight, or nearly so, with the bottom of the interior thereof at a point distant from the point F, Fig. 1, and between said point and the point L, Fig. 2, made wavy or undulating, of not too abrupt character, but of uniform occurrence. These waves may be made either by indentation, elevations, or both, or linings, false bottoms, &c. By means of the pipes I I the air in the pipe G will be exhausted at the points L L, and the current of air from the reservoir, where it is maintained continuously at any desired pressure, or the atmosphere at its natural pressure, will rush through the tube G in the direction of the receiver K, Fig. 2, carrying whatever of limited quantities of grain, flour, or other commodity is continuously introduced into the current at a distance from the point A, the reservoir, or place of ingress of the air.

The manner of introducing or projecting the substance—grain, flour, &c.—to be transported into the current of moving air is to fill one of the air-tight bins E, Fig. 1, through the valve D, then close the valve D, turn on the pressure of the air from the reservoir by means of the valve or stop-cock *s*, open the valve or switch R, Fig. 1. The grain and flour or other article thus introduced into the moving current of air will rush with the current in suspension through the tube G with that velocity with which air under great pressure will seek to fill a vacuum, which vacuum will at all times be maintained, as nearly as is practicable.

To keep the grain, &c., off the bottom of the tube to prevent wear and friction, the waves or undulations H, Fig. 1, are made, and in such form as to be uniform and to create an upward current or tendency to the air, from which upward and onward current or trend the grains of wheat or particles of flour, &c., will constantly be receiving upward as well as onward motion, and cause the same to be transported in suspension. Point L, Fig. 2, will be located near the receiver K. The momentum of the article in transit will carry it past the exhaust-pipe L into the receiver K, which also has an exhaust-pipe through which any air that may escape into the receiver K will be exhausted. When the first receiver K has become nearly filled the pipe G will be connected through the switch P, Fig. 2, with the other receiver, from which in the meantime the air has been exhausted. At the time the switch to the second receiver is being made the switch N, Fig. 2, will be turned so as to cut off communication between the second receiver and the discharge-pipe M, Fig. 2, and at the same time allow the mails, flour, grain, or other substance in transit to be discharged from the first receiver through the pipe M into the pipe G', Fig. 2, through which a current of air is rushing from the reservoir A, Fig. 2, and so the operation of imparting a new impetus or momentum to the article in transit may be repeated as often as may be required.

The pipe G may be laid on the ground or in the earth or suspended above the earth, and may be placed at any angle less than forty-five degrees without material interference with the working of the system. The receiver K will be placed at a point of considerable elevation above the surface of the earth at exposed points, and upon curves where the wave or undulating surface of the interior of the pipe, as shown at point H, Fig. 1, of pipe G, and consequent upward or side, as the case may be, current or trend to the air in the pipe G is not sufficient to prevent violent contact between the pipe G and the article in transit. The pipe should be lined with paper or other elastic substance, or be made of paper or such substance, or be coated on the interior surface with wax or other elastic or pliable substance. Of course the exhaust or vacuum will be located and maintained by any suitable means through the exhaust-tubes I I, Fig. 2, and any artificial pressure required at the remote end of the pipe G can be created and maintained by any suitable apparatus working into or communicating with the reservoirs A A respectively, Figs. 1 and 2.

I am aware that prior to my invention pneumatic conveyers have been used. I therefore do not claim such a combination, broadly.

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a pneumatic machine or apparatus, of a tube or pipe, G, through which a current of air is passed toward the receiver K at great velocity, and into which current, in limited quantities, at a point distant from the point of ingress of the air, is introduced or projected the mail-matter, flour, grain, or other article to be transported.

2. In a pneumatic apparatus, the combination of a pneumatic pipe or tube through which a current of air is passing with great velocity in the direction of the receiver K, the bins or hoppers E E, located at a distance from the point of ingress of the air into the tube G, and communicating therewith, the pipe B, Fig. 1, with stop-cocks *s s* and valves or slides D.

3. The uneven wave-like and undulating interior of the pipe, indented or raised and indented between the point F (and at a distance therefrom) and the point L.

4. The causing of an upward or side or both upward and side trend or current of air in the pipe G by means of the uniform unevenness (at any required point) of the interior of the pipe, causing the air in passing at regular intervals to be compressed, giving the article in transit such new impetus and direction in its flight as may be desired.

5. The exhaust-pipes I I, connecting with said tube G and receiver K, respectively, and having their ends protected by screens or bars so arranged as to draw the air from said pipe G and receiver K, respectively, as nearly in the line

from which the article in transit arrives as is practicable, the exit of the air being from the direction of the receiver, leaving the article in transit by its momentum to enter and settle into the receiver K.

6. The combination of the receivers K K with the discharge-pipe M and switch N, discharging into the pipe G' into a current of air moving with great velocity through said pipe G' from the point of ingress, (for said air,) and the reservoir A, the renewing of the momentum first imparted by means of the helper or pipe G', through which a current of air is impelled at great velocity.

7. In a pneumatic machine or apparatus, the combination of the reservoirs A A, the pipe B, connecting with the bins or hoppers E E, (with valves D,) and valves R R, connecting (at a point distant from the reservoir A) with the pipe G, through which a continuous current of air is propelled with or moving with exceeding great velocity toward the receiver K, and into which rapidly-moving current in said tube G grain, flour, the mails, or other article to be transported is introduced in limited but continuous quantity through the pipe F, and kept from the sides and bottom of said pipe G through the current of air created by suitable indentations or projections or both in the interior of the tube until the said article reaches the receiver K, and, further, the combination aforesaid, together with the receivers K K, with switch N and discharge-pipe M, connecting with the pneumatic pipe G', connecting with the reservoir A and like exhaust-pipes I I and apparatus and like receivers.

8. A pneumatic pipe with the interior surface thereof lined or coated with paper, wax, or other elastic substance.

9. The transmitting or transporting in suspension through the pipe (pneumatic pipe G) of the article to be transported—grain, flour, &c.—by the inertia of moving air passing through the tube with terrific velocity over its uniform undulating—either raised or indented, or both—interior or part thereof, and causing at any given point or points in said pipe a current of air to move in any desired direction or trend by the same means.

10. The introduction into a continuous current of rapidly-moving air or other elastic fluid (at a point distant from the point of ingress thereof) of a continuous and limited quantity of flour, grain, or other article to be transported, all substantially as set forth.

JAMES W. BEACH.

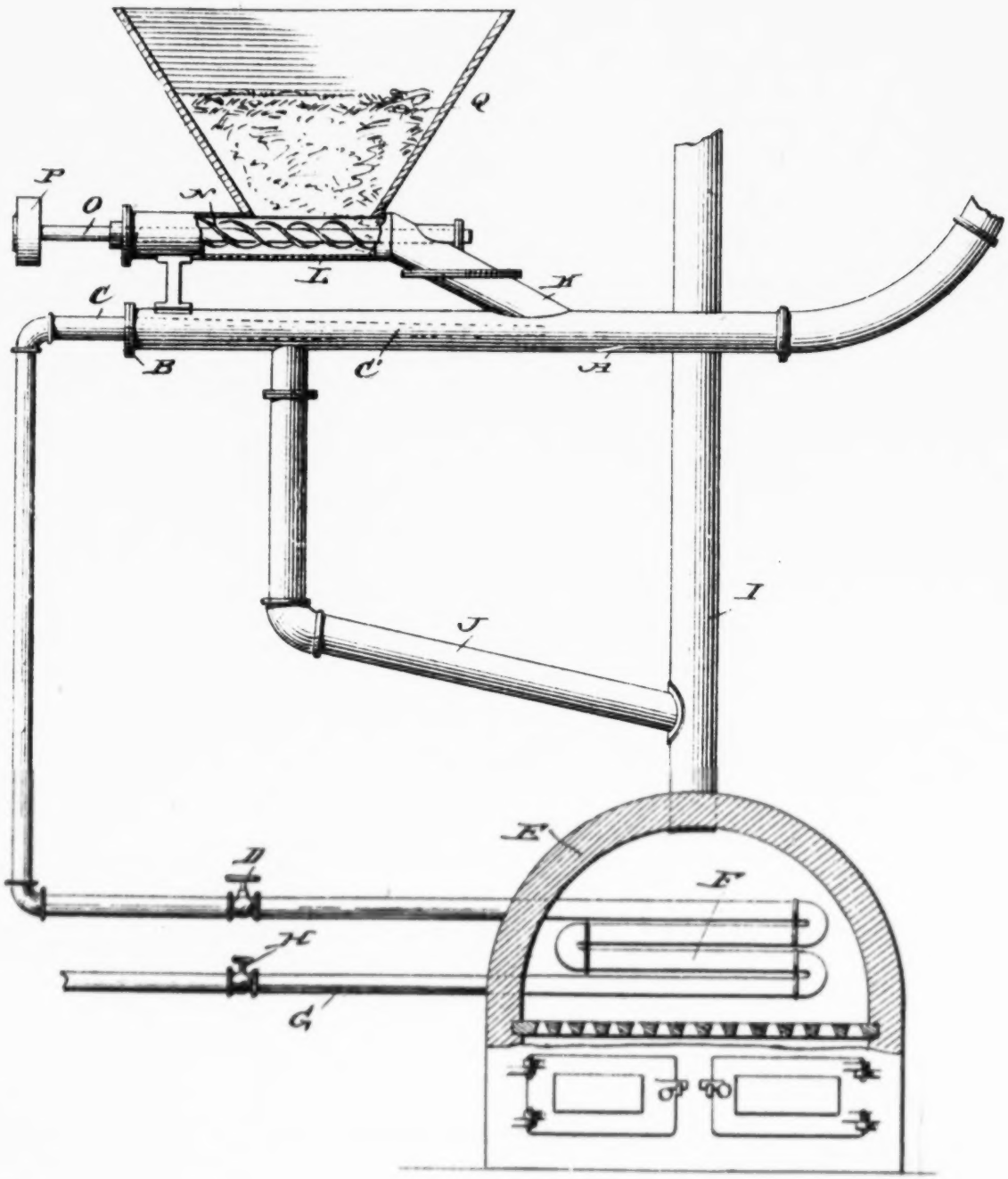
Witnesses:
F. W. ADAMS,
JESSE COX, Jr.

(No Model.)

J. S. WALLACE.

REFUSE EJECTOR.

No. 408,201 Patented July 30, 1889.



WITNESSES:
W. R. Davis
A. Sedgwick

INVENTOR
J. S. Wallace
BY Munn & Co
ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN S. WALLACE, OF NELSONVILLE, OHIO, ASSIGNOR TO HIMSELF, WILLIAM B. BROOKS, JR., AND FRANK A. PRENDERGAST, OF SAME PLACE

REFUSE-EJECTOR.

SPECIFICATION forming part of Letters Patent No. 408,201, dated July 30, 1889.

Application filed March 11, 1889. Serial No. 302,784. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. WALLACE, of Nelsonville, in the county of Athens and State of Ohio, have invented a new and Improved Refuse-Ejector, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved refuse-ejector, which is very simple and durable in construction, effective in operation, and specially designed to remove refuse from ocean steamers, coal-mines, mills, caissons, &c.

The invention consists of a discharge-pipe closed at one end and into which projects and opens a steam-pipe carrying superheated steam, a refuse feed-pipe discharging into the said discharge-pipe at the end of the steam-pipe, and a gas-pipe also opening into the said discharge-pipe between its closed end and the said discharge end of the said refuse-pipe and steam-pipe.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawing, in which the figure is a side elevation of the improvement with parts in section.

The discharge-pipe A, of suitable diameter, is closed at one end at B, and is provided at its other end with suitable connections or extensions of any desired length. Into the closed end of the discharge or ejecting pipe A extends a superheated-steam pipe C, having its inner end C′ nozzle-shaped and opening into the said discharge-pipe a suitable distance from the closed end B. The steam-pipe C is provided with a valve D, and extends into a furnace E, of any approved construction, connecting at its inner end with a coil of pipe F, located above the grate-bars of the said furnace and provided with any desired number of bends. The coil of pipe F connects at its other end with a steam-pipe G, extending to the outside of the furnace E and connecting with the boiler supplying the necessary steam. A valve H is formed in the said pipe G outside of the furnace E, and the steam from the boiler passing through the said pipe when the valve H is opened is superheated in the coil of pipe F and passes in a superheated state into and through the pipe C to the discharge-pipe A.

From the furnace E leads the usual chimney I, provided a short distance from the furnace E with a branch pipe J, connecting with the discharge-pipe A at a point between the inner end of the nozzle C′, and the closed end B.

Into the discharge-pipe A opens an inclined pipe K, directly above the front end of the nozzle C′, said inclined pipe K connecting at its upper end with a pipe L, extending horizontally and carrying a feed-screw N, fastened on a suitable shaft O, mounted to turn in suitable bearings in the ends of the said pipe L, and provided on its outer end with a pulley P, connected with a suitable driving mechanism for imparting a rotary motion to the said shaft O.

Into the pipe L and onto the feed-screw N opens a hopper Q, containing the refuse to be ejected. When the feed-screw N is rotated, the refuse from the hopper Q is forced into the inclined pipe K, and from the latter into the discharge-pipe A.

The operation is as follows: When the valve H in the pipe G is opened, steam is admitted from the boiler to the coil F in the furnace E, is superheated in the same to the required degree, and then passes through the pipe C into the discharge-pipe A. The velocity of the steam escaping from the nozzle C′ creates a vacuum in the discharge-pipe A between the nozzle end and the closed end B. In consequence of this vacuum a draft is created in the chimney I, so that the smoke and gases from the furnace E are drawn through the branch pipe J into the discharge-pipe A, and the hot gases combine with the superheated steam at the inner end of the nozzle C′. The power and value of the superheated steam is thus increased by the addition of the smoke and gases from the furnace E. The refuse fed through the inclined pipe K from the hopper Q immediately in front of the nozzle C′ is acted on by the combined force of the superheated steam and gases, so as to force said refuse through the open end of the pipe A to any desired place to which the said pipe A leads.

It will be seen that the velocity with which the refuse is discharged is governed by the velocity of the escaping superheated steam and gases rushing through the pipe A. It is to be understood that the velocity with which the refuse is ejected depends greatly on the

pressure maintained in the boiler and the distance the refuse has to be carried through the pipe A before being deposited.

It is to be further understood that the device can be used for a number of purposes. It is, however, particularly adapted for ejecting refuse to any height and at any desired angle. At coal-mines, where slack and culm have to be disposed of, it is necessary, in order to save room and prevent the obstruction of land, to pile the slack and culm up as high as possible, and as the pipe A can be extended vertically to any desired height the slack or culm can be easily ejected through the said pipe in the manner above described.

Ashes from boilers and furnaces can also be piled up to any desired elevation to save room, or carried long distances, reducing the expense to a minimum. Sawdust from mill-pits, which it requires a great amount of labor and expense to remove, can by the use of this device be taken long distances and to great heights and discharged at a great saving of expense. In large ocean steamers, where the hoisting of ashes and dirt from the hold and engine-rooms is now a slow and laborious proceeding, the work can be made easy, cheap, and efficient, irrespective of stormy or calm weather.

The device is further adapted to the sinking of caissons, for the ejection of the sand and dirt from the interior of the caisson. It is also adapted for ejecting the dirt and mud from dredging-machines to the banks of a canal or stream.

A variety of refuse can be ejected, such as tan-bark, garbage, sand, &c.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a refuse-ejector, the combination, with a discharge-pipe closed at one end, of a steam-pipe carrying superheated steam and opening into the said discharge-pipe, a refuse feed-pipe held at an angle and discharging into the said discharge-pipe at the nozzle end of the said steam-pipe, and a gas-pipe also opening into the said discharge-pipe between its closed end and the said inner end of the said refuse feed-pipe, substantially as shown and described.

2. In a refuse-ejector, the combination, with a discharge-pipe closed at one end, of a steam-pipe carrying superheated steam and opening into the said discharge-pipe, a refuse feed-pipe held at an angle and discharging into the said discharge-pipe at the nozzle end of the said steam-pipe, a gas-pipe also opening into the said discharge-pipe between its closed end and the said inner end of the said refuse feed-pipe, and a furnace discharging into the said gas-pipe and serving to superheat the steam passing through the said steam-pipe, substantially as shown and described.

3. In a refuse-ejector, the combination, with a discharge-pipe closed at one end, of a steam-pipe carrying superheated steam and opening into the said discharge-pipe, a refuse feed-pipe held at an angle and discharging into the said discharge-pipe at the nozzle end of the said steam-pipe, a gas-pipe also opening into the said discharge-pipe between its closed end and the said inner end of the said refuse feed-pipe, and a feed-screw held in the said feed-pipe to discharge the refuse from the said feed-pipe to the nozzle end of the said steam-pipe, substantially as shown and described.

4. In a refuse-ejector, the combination, with a discharge-pipe closed at one end, of a steam-pipe carrying superheated steam and opening into the said discharge-pipe, a refuse feed-pipe held at an angle and discharging into the said discharge-pipe at the nozzle end of the said steam-pipe, a gas-pipe also opening into the said discharge-pipe between its closed end and the said inner end of the said refuse feed-pipe, a feed-screw held in the said feed-pipe to discharge the refuse from the said feed-pipe to the nozzle end of the said steam-pipe, and a hopper containing the refuse and opening on the said feed-screw, substantially as shown and described.

5. In a refuse-ejector, the combination, with a discharge-pipe closed at one end, of a steam-pipe provided with a nozzle extending into the closed end of the said discharge-pipe, a coil of pipe connected with the said steam-pipe and also connected with the boiler, a furnace containing the said coil of pipe and serving to superheat the steam in the said coil of pipe, a feed-pipe discharging into the said discharge-pipe at the end of the nozzle of the said steam-pipe, a chimney extending from the said furnace, and a branch pipe leading from the said chimney into the said discharge-pipe between its closed end and the end of the nozzle, substantially as shown and described.

6. In a refuse-ejector, the combination, with a discharge-pipe closed at one end, of a steam-pipe provided with a nozzle extending into the closed end of the said discharge-pipe, a coil of pipe connected with the said steam-pipe and also connected with the boiler, a furnace containing the said coil of pipe and serving to superheat the steam in the said coil of pipe, a feed-pipe discharging into the said discharge-pipe at the end of the nozzle of the said steam-pipe, a chimney extending from the said furnace, a branch pipe leading from the said chimney into the said discharge-pipe between the closed end and the end of the nozzle, and a feed-screw connected with a hopper and discharging into the said feed-pipe, substantially as shown and described.

JNO. S. WALLACE.

Witnesses:
L. L. BORT,
J. R. ARMSTRONG.

(No Model.) 4 Sheets—Sheet 1.

S. C. DAVIDSON.

PNEUMATIC APPARATUS FOR ELEVATING OR CONVEYING TOBACCO LEAF, TEA LEAF. WOOD CHIPS, &c.

No. 599,055. Patented Feb. 15, 1898.

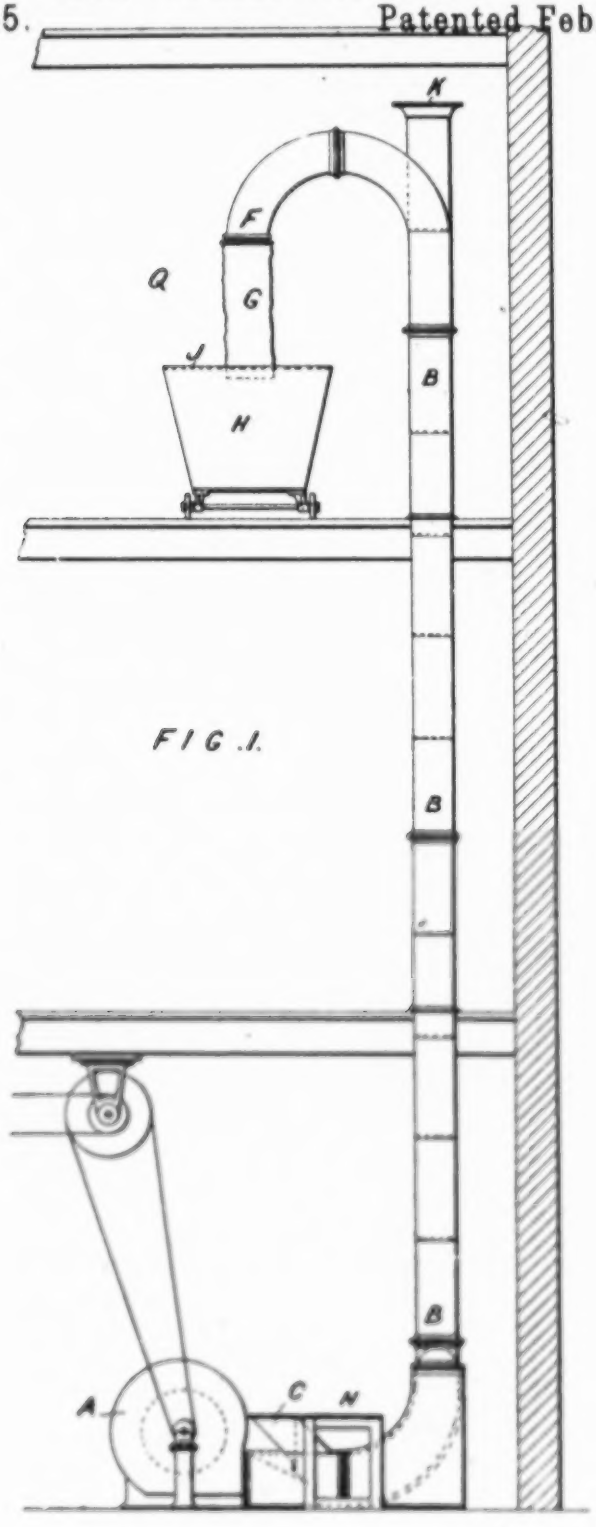


FIG. 1.

WITNESSES
Fred Whitz
Thomas J. Wallace

INVENTOR
Samuel Cleland Davidson,
By his Attorneys
Wilson C. Fraser & Co

(No Model.) 4 Sheets—Sheet 2.

S. C. DAVIDSON.

PNEUMATIC APPARATUS FOR ELEVATING OR CONVEYING TOBACCO LEAF, TEA LEAF, WOOD CHIPS, &c.

No. 599,055. Patented Feb. 15, 1898.

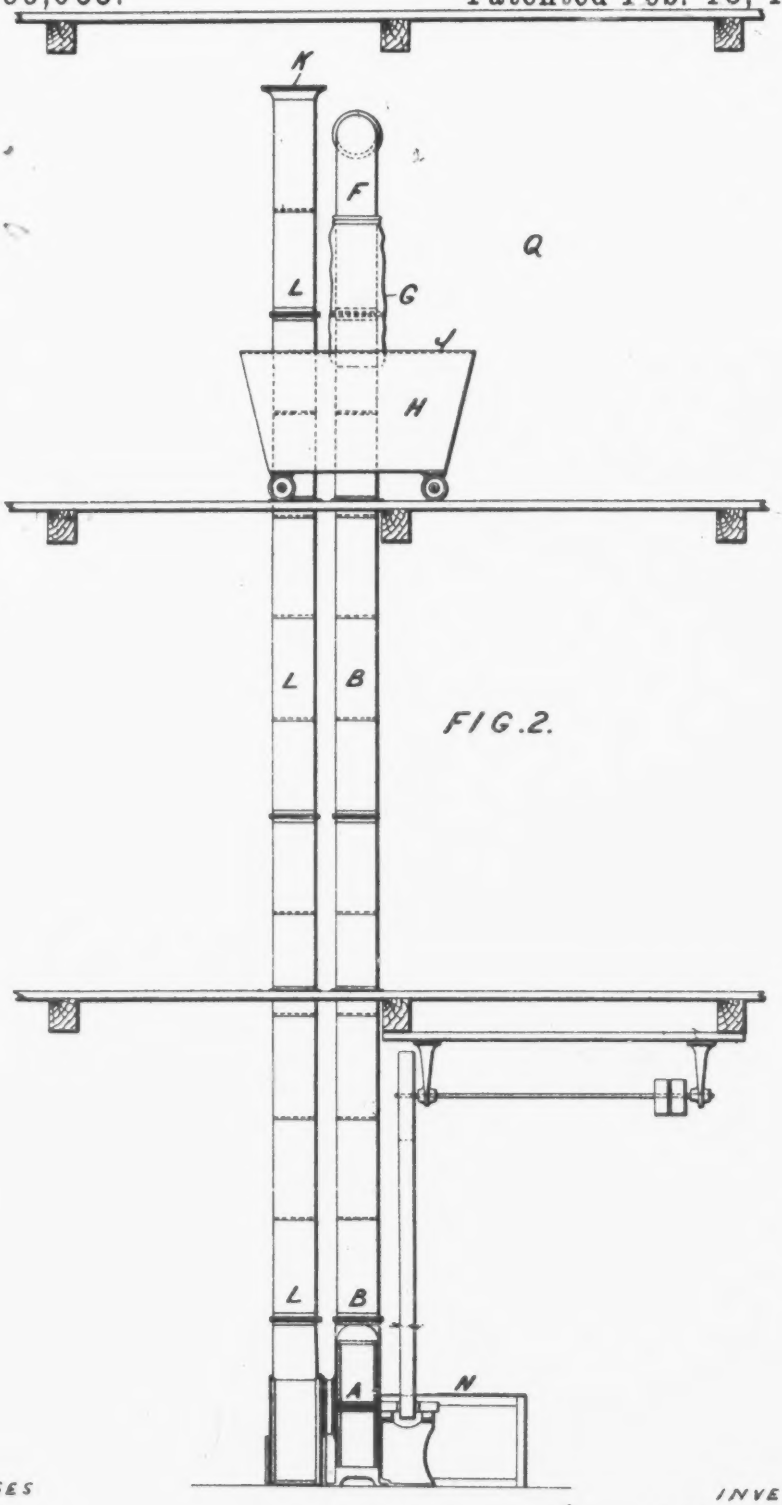


FIG. 2.

WITNESSES
Fred White
Thomas J. Wallace

INVENTOR:
Samuel Cleland Davidson,
By his Attorneys
Arthur C. Fraser & Co

(No Model.) 4 Sheets—Sheet 3.

S. C. DAVIDSON.

PNEUMATIC APPARATUS FOR ELEVATING OR CONVEYING TOBACCO LEAF, TEA LEAF, WOOD CHIPS, &c.

No. 599,055. Patented Feb. 15, 1898.

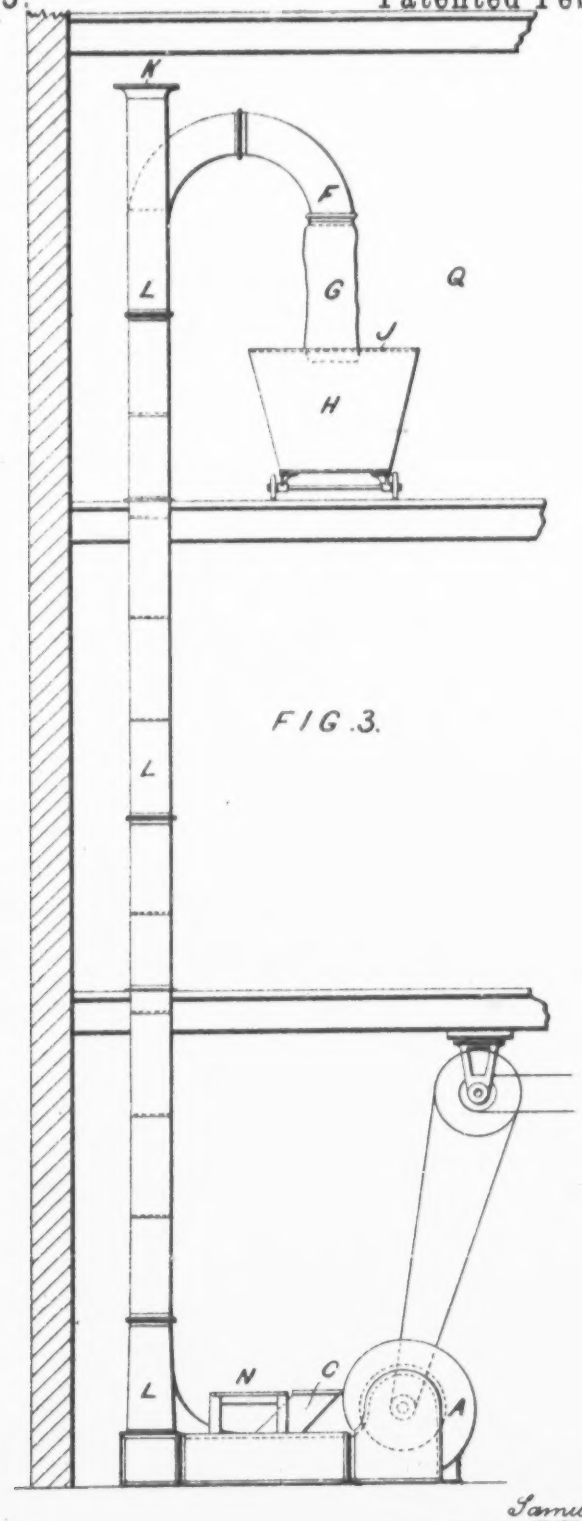


FIG. 3.

WITNESSES.
Fred White
Thomas F. Wallace

INVENTOR
Samuel Cleland Davidson
By his Attorneys
Arthur C. Fraser & Co.

(No Model.) 4 Sheets—Sheet 4.

S. C. DAVIDSON.

PNEUMATIC APPARATUS FOR ELEVATING OR CONVEYING TOBACCO LEAF, TEA LEAF, WOOD CHIPS, &c.

No. 599,055. Patented Feb. 15, 1898.

FIG. 5.

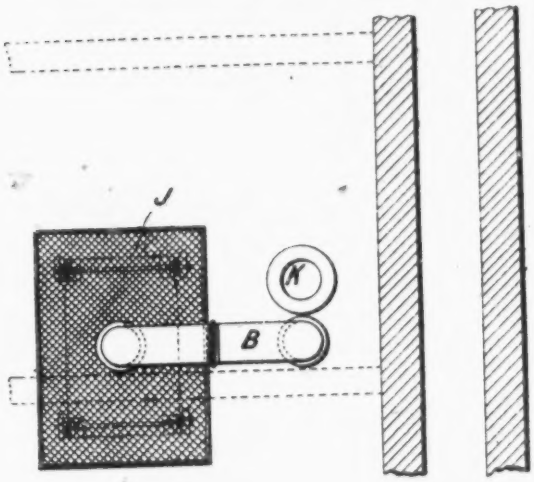


FIG. 4.

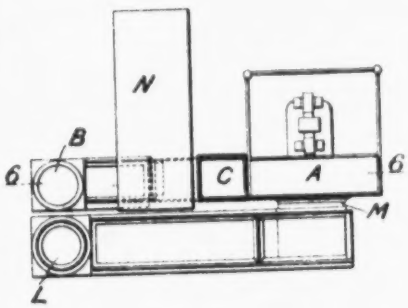
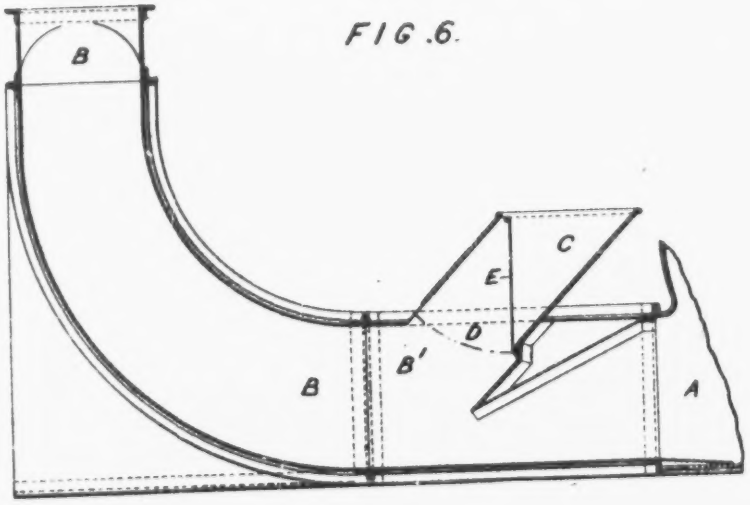


FIG. 6.



WITNESSES

Fred Whitz

Thomas F. Ballard

INVENTOR:

Samuel Cleland Davidson,

By his Attorneys

Wilkinson, Fraser & Co.

UNITED STATES PATENT OFFICE.

SAMUEL CLELAND DAVIDSON, OF BELFAST, IRELAND.

PNEUMATIC APPARATUS FOR ELEVATING OR CONVEYING TOBACCO-LEAF, TEA-LEAF, WOOD-CHIPS, &c.

SPECIFICATION forming part of Letters Patent No. 599,055, dated February 15, 1898.

Application filed July 24, 1897. Serial No. 645,827. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL CLELAND DAVIDSON, merchant, of Sirocco Engineering Works, Belfast, Ireland, have invented certain new and useful Improvements in Pneumatic Apparatus for Elevating or Conveying Tobacco-Leaf, Tea-Leaf, Wood or other Chips or Cuttings, or other Materials, of which the following is a specification.

My invention has reference to pneumatic apparatus for elevating or conveying tobacco-leaf, tea-leaf, wood or other chips or cuttings, or other materials.

The improved apparatus has been more particularly designed for elevating tobacco-leaf.

The chief features of the invention, apart from the general construction or arrangement of the apparatus, are an automatically opening and closing flap door or valve between a feed-hopper and the blast-pipe for the purpose hereinafter set forth, a special arrangement of truck or receptacle at the delivery end of the blast-pipe, and a return-pipe leading from the receiving-room back to the fan or air-propeller, so that the same air is used over and over again in the elevator and in the delivery-room, which is of importance when dealing with some materials—tobacco-leaf, for example.

Having stated the chief features of the invention, I will describe an apparatus in which the improvements are embodied.

In the accompanying drawings, Figure 1 is a side elevation of a pneumatic elevating apparatus constructed according to this invention. Fig. 2 is a front elevation. Fig. 3 is a side elevation taken from the opposite side to that shown in Fig. 1. Fig. 4 is a plan of the lower or receiving portion, showing the fan and the feed-hopper. Fig. 5 is a plan of the upper or delivering portion, illustrating the delivery into a truck. Fig. 6 is a part vertical section on the line 6 6 of Fig. 4, on a larger scale than the other figures, to show the arrangement of the feed-hopper door.

The apparatus consists of a duct or pipe B, through which a strong blast of air is driven from an air-propeller, preferably in the form of a fan A, as shown, a hopper C being attached to the duct B at the fan end and so constructed that when a basketful of tobacco-leaf or other material to be elevated or conveyed through the duct B is thrown into same the leaf drops into an eddy-space B' in the duct formed by enlarging the upper side of the duct, the enlargement gradually converging again to the normal size of the duct, as seen in Fig. 6, in the direction that the blast is moving. There is an inlet port or opening D from the hopper to the said eddy-space B' fitted with a flap door or valve E, which after a basketful or like quantity of leaf or other material has fallen through the hopper doorway or port D and right into the blast-current is at once automatically blown back, so as to close the inlet-port, as seen in Fig. 6, by the temporary back pressure of the air-blast against the back of the flap-door E, due to partial obstruction momentarily caused by the material falling into the air-blast and until same imparts momentum thereto. This automatic closure of the hopper-door E so confines and prevents the escape of any of the air-blast that its full pressure operates on the material thrown into the duct until it has acquired the same velocity as the blast or been discharged at the delivery end of the duct, when the hopper-door freely opens again, and a further supply of material may be thrown in.

N is a table upon which the material to be elevated may be laid, so as to be more conveniently fed into the hopper C.

In the case of some materials—tobacco-leaf, for example—it is in some instances undesirable to deliver into the leaf-receiving room Q such a large volume of fresh air as would be continuously issuing from the delivery end of the conveyer-duct B while working if such air were drawn from another room or from the open air. In order to obviate this, I lead a return-pipe L, having an open mouth or inlet K, from the said delivery-room back to the eye of the fan A, so that the air used in the conveyer-duct B is practically the same air circulating through it over and over again, owing to this air being withdrawn from the same room or compartment Q as the material is being delivered into. Hence the air in the

receiving-room Q is neither added to nor diminished, nor is the degree of atmospheric moisture in the room altered while the apparatus is working, which in some cases is of much practical importance.

In order to collect the leaf or other material in an open-topped box-shaped truck or receptacle at the delivery end of the conveyer-duct B, I keep the delivery end at a sufficient elevation above the ground or floor that when a downwardly-directed bend F is applied thereon there is room for the truck or wagon H to be placed under it, and I apply on the top of the truck a cover J, of wire-netting or other foraminous material, with a central hole in it of approximately the size of the mouth of the conveyer-duct, and I place the truck so that the mouth of the duct, with or without an elongation G, of flexible material, such as canvas, is fair over and the flexible elongation, when used, hanging into the central hole in the wire-netting cover J. This cover, while allowing the free escape of the air reverberating off the bottom and sides of the truck, catches any of the leaf or material which blows upward along with it, and the same falls back again into the truck.

The employment of this device obviates any necessity for what is known as a "stive" or collecting-room.

What I claim, and desire to secure by Letters Patent, is—

In pneumatic apparatus for elevating or conveying tobacco-leaf or other material, the combination of a blast-pipe having an enlargement at the upper side where the material is fed to it, a hopper through which the material is fed into said blast-pipe, and a flap door or valve between the feed-hopper and the blast-pipe and normally more or less open toward the blast-pipe, whereby when a charge of the material is fed through the hopper into the blast-pipe through the door temporary back pressure of the air-blast pipe is produced against the back of the door and the door is therefore automatically closed until the said back pressure ceases, substantially as and for the purpose hereinbefore described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

SAMUEL CLELAND DAVIDSON.

Witnesses:
JOHN BROWN SHAW,
ARCHIBALD H. R. CARR.

318

No. 873,345. PATENTED DEC. 10, 1907

W. L. CANNIFF.

PNEUMATIC GROUT MIXING AND DISCHARGING APPARATUS.

APPLICATION FILED OCT. 29, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

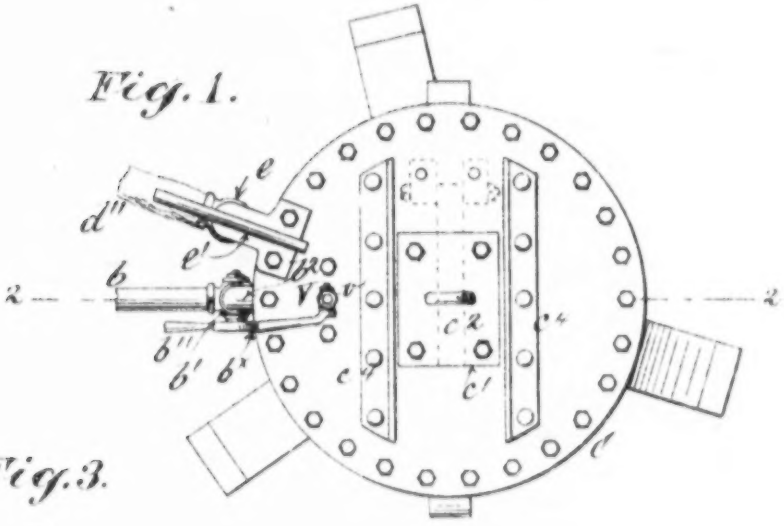


Fig. 3.

Fig. 2.

Fig. 4.

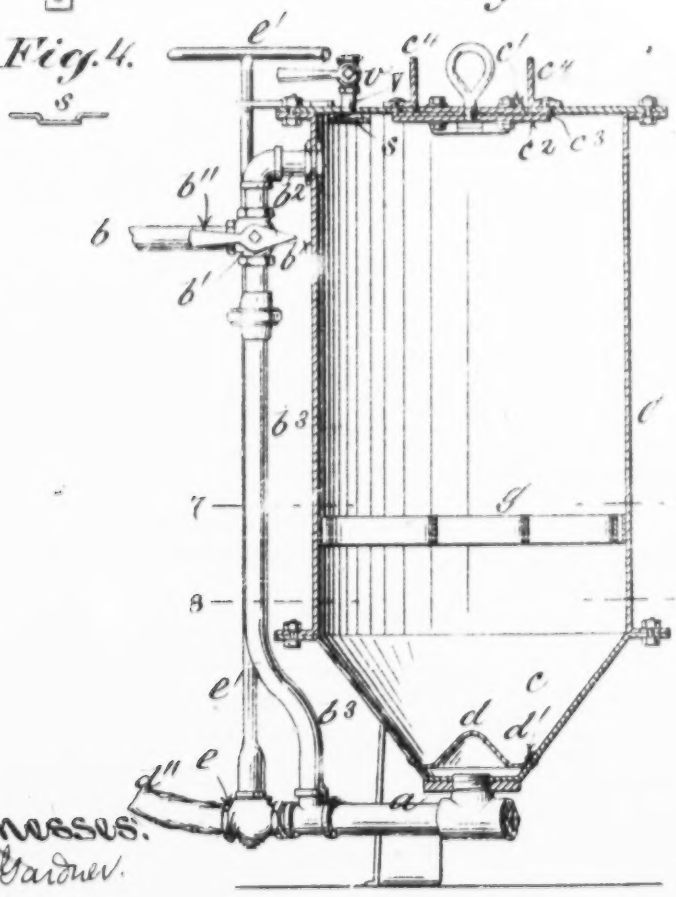


Fig. 5.

Fig. 6.

Witnesses:
D. W. Gardner.
J. Edna

Inventor:
William L. Canniff
By his Attorney
Geo. W. Meath

No. 873,345. PATENTED DEC. 10, 1907.

W. L. CANNIFF.

PNEUMATIC GROUT MIXING AND DISCHARGING APPARATUS.

APPLICATION FILED OCT. 29, 1906.

2 SHEETS—SHEET 2.

Fig. 7.

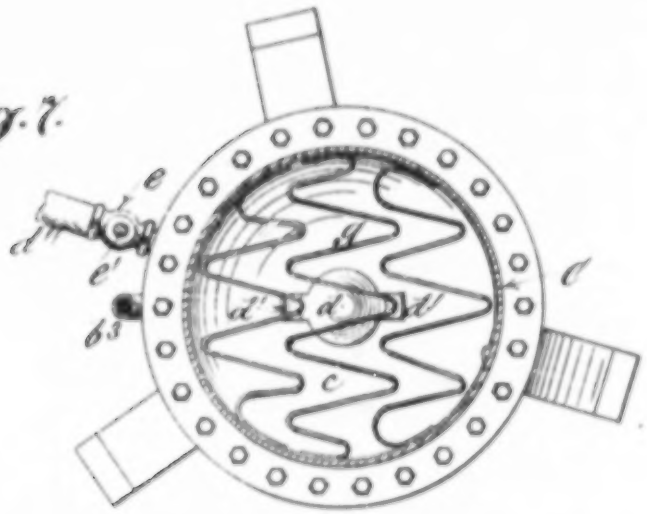
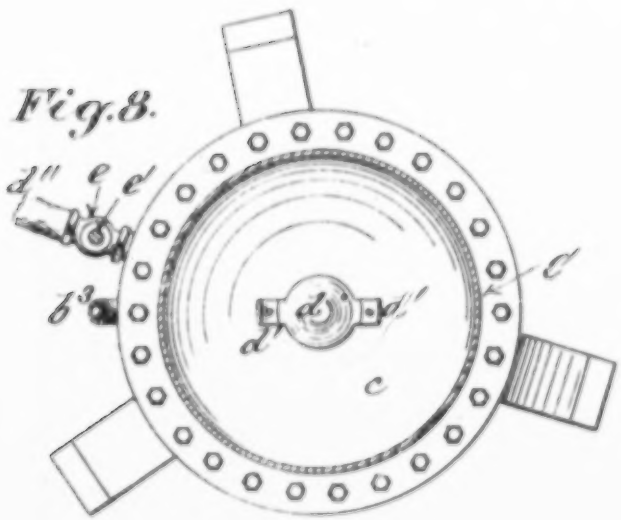


Fig. 8.



Witnesses:
D. W. Gardner
Edna

Inventor:
William L. Canniff
By his Attorney
Leo. Wm. Mudd.

UNITED STATES PATENT OFFICE.

WILLIAM L. CANNIFF, OF NEW YORK, N. Y.

PNEUMATIC GROUT MIXING AND DISCHARGING APPARATUS.

No. 873,345. Specification of Letters Patent. Patented Dec. 10, 1907.

Application filed October 29, 1906. Serial No. 341,042.

To all whom it may concern:

Be it known that I, WILLIAM L. CANNIFF, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Pneumatic Grout Mixing and Discharging Apparatus, of which the following is a specification.

The object of my invention is to effect the admixture of the constituent parts of grout in a more simple, rapid and effective manner than heretofore, at the same time dispensing with mechanical mixers, motors and the like, and rendering the operation essentially automatic in character. Mechanical mixers, with their motors and other essentials are relatively expensive in the first place, necessitate the use of skilled labor, and even with the best of care and attention, need, owing to the gritty character of the material treated, almost constant repair and replacement of parts, so that the expense of running and maintenance is burdensome and detracts materially from their value and utility. I obviate these objections by dispensing entirely with operative parts in the sense that I effect the admixture of the grout without the aid of mechanical beaters, arms or agitators, by means of compressed air. Furthermore, the admixture of elements is more uniform and perfect, and is accomplished in much less time than heretofore.

The invention consists primarily in injecting compressed air into the aggregated material, as sand, cement and water, in such manner that the air in expanding passes through the same, thoroughly agitating and admixing the ingredients by a process which may be designated as "boiling" or analogous thereto. As a result, a uniform blending and distribution of the component parts of the mass is quickly attained, after which compressed air is further utilized to effect the discharge of the admixture as heretofore.

My invention also includes certain specific features in the construction and arrangement of parts hereinafter described and claimed.

In the accompanying drawings, Figure 1, is a plan of a mixing chamber and connections embodying the essential features of my invention; Fig. 2, is a sectional elevation taken upon plane of line 2—2—Fig. 1; Fig. 3, is a plan in detail of the underside of the vent shield; Fig. 4, an edge view of the vent shield; Fig. 5, is a plan of the deflector; Fig. 6, a side elevation thereof; Fig. 7, is a horizontal section on plane of line 7—7—Fig. 2; Fig. 8, is a horizontal section on plane of line 8—8—Fig. 2.

In the practical application of my invention the form or configuration of mixing chamber C is of secondary importance, and I do not limit myself in this respect, neither do I restrict myself to the identical arrangement of parts herein shown, since modifications thereof may be resorted to with like result,—the essential feature in this respect being the use of means whereby compressed air may be forced through the ingredients within the chamber for the purpose set forth.

Obviously a preferable arrangement for practical reasons is to employ a mixing chamber C, the main portion of which is of cylindrical form, and to introduce the compressed air at the bottom of said chamber, so that the air in rising will thoroughly agitate the contents of the chamber. This I prefer to do through the medium of a pipe which is also used as a medium of discharge for the grout after the admixture of the component parts thereof. The lower portion of the chamber C is closed by an inverted conical section *c*, through the truncated end of which the pipe *a*, projects. Over the open end of the pipe *a*, is arranged a deflector *d*, preferably in the form of an inverted dish shaped plate formed with flanged lugs *d'*, by which it is secured to the conical section *c*.

b, is an air pipe extending to any suitable source of supply of air under pressure. This compressed air pipe *b*, enters a three way valve *b'*, communicating through the pipe b^1, with the upper part of the cylinder C and through the pipe b^2, with the combined air inlet and grout discharge pipe *a*. The handle *b''*, of the three way valve *b'*, is formed with a pointer b^3, which indicates the direction of air flow when the valve is open,—the valve being shown as in its closed position in the drawings.

e, is a discharge valve controlled by the handle *e'*.

g, is a transverse grating of any suitable or desired construction inserted in the mixing chamber C to assist in breaking up and disintegrating any lumps of cement or sand inadvertently introduced into the chamber C. As shown in the drawings the grating consists of three zig zag strips of flat metal placed edge-wise with relation to the vertical axis of the cylinder C, with ample space be-

tween their opposed surfaces for the passage of the contents of the chamber in either direction, as will be seen by reference to Fig. 7.

The ingredients of the grout are introduced into the mixing chamber C through the opening c', closed preferably by a swinging door c^2, opening inward and provided with a gasket c^3, for forming an air tight joint when the door is closed,—the door being held by internal pressure in use.

c^4, c^4, are angle beams on the exterior of the cover adjoining the door opening c', and are designed to stiffen and reinforce the edges of said openings so as to insure a close seal with the gasket c^3, on the door c^2.

V is a vent pipe provided with a stop cock v,—the inner end of the vent pipe being protected by a screen s, which admits of the escape of air while intercepting and deflecting any of the grout mixture that might otherwise pass to the vent.

Attached to the discharge valve e, is a flexible pipe d'', through and by which the mixed grout is distributed.

The operation is as follows. The valves b' and e, being closed, the material is introduced through the opening c', the cock v, in the vent tube V opened, the door c^2, closed, and the valve b', turned with the pointer b^x downward, admitting compressed air to the chamber C, and thereby sealing the door c^2, by excess of internal pressure. As the compressed air escapes from the pipe a, it expands and rises, being deflected by the inverted plate d, through the grout material, violently agitating the latter and causing a state of ebullition which results in a thorough and uniform admixture of the ingredients. During this action air escapes around the edges of the shield s and through the vent V. A fraction of a minute (about 30 seconds in fact) is sufficient to insure a thorough blending and distribution of the ingredients to form the grout by this method of "boiling" or agitation, when the valve v, may be closed and the valve b', reversed to shunt the compressed air into the top of the cylinder C, when the valve e, being opened, the grout is discharged by displacement by the pressure and accumulation of compressed air above it in the mixing chamber. In this connection, I wish to state that I am aware that compressed air has been used to force grout from a mechanical mixer, but I am not aware that compressed air has heretofore been employed to agitate and mix the ingredients as a preliminary to such discharge.

It will be seen that my apparatus is extremely simple and inexpensive, there being no operative parts, and nothing to get out of order. Practically the device cleans and lubricates itself in action, and may be used effectually by unskilled labor. Furthermore it is of light and portable structure, a feature of importance in the art to which it appertains as will be readily understood, since it can be transported to the immediate vicinity of the place where the grout is to be applied, and the grout formed and applied direct while fresh and in the best condition. Thus not only save time in the preparation of the grout, but also in handling and manipulation. I have found by practical experience that by my method the materials may be more thoroughly and satisfactorily mixed in one third the time involved in the use of the mechanical mixers, which it is designed to replace, while the cost of my apparatus is comparatively speaking, merely nominal, and the cost for repairs is practically eliminated.

What I claim as my invention and desire to secure by Letters Patent is,

1. In a device of the character designated, the combination of a mixing chamber, means for introducing material to be mixed into said chamber, means for sealing said chamber, and means connected with said chamber for injecting compressed air therein below the material contained therein for the purpose of mixing the same.

2. In a device of the character designated, the combination of a mixing chamber, means for introducing materials to be mixed in said chamber, means for sealing said chamber, means connected with said chamber for injecting compressed air therein below the material contained therein for the purpose of mixing the same, and an air vent and vent valve connected with said chamber, for the purpose described.

3. In a device of the character designated, the combination of a mixing chamber, means for introducing materials to be mixed in said chamber, means for sealing said chamber, means connected with said chamber for injecting compressed air therein below the material contained therein for the purpose of mixing the same, and means for discharging said chamber of its contents by air pressure for the purpose described.

4. In a device of the character designated, the combination of a mixing chamber, means for introducing materials to be mixed in said chamber, means for sealing said chamber, means connected with said chamber for injecting compressed air therein below the materials contained therein for the purpose of mixing the same, an air vent and vent valve connected with said chamber, and means for discharging the mixed material by air pressure for the purpose described.

5. In a device of the character designated, the combination of a mixing chamber, means for introducing materials to be mixed in said chamber, means for sealing said chamber, means connected with said chamber for injecting compressed air therein below the material contained therein for the purpose of mixing the same, an air vent and vent valve

connected with said chamber, and a shield in said chamber opposed to and protecting said vent for the purpose described.

6. In a device of the character designated, the combination of a mixing chamber having an inverted conical bottom, a pipe entering the truncated end of said conical bottom and connected with a discharge pipe and with a compressed air pipe, a compressed air pipe entering the upper portion of said mixing chamber, valves controlling said pipe, means for introducing materials to be mixed in said chamber and means for sealing said chamber, for the purpose described.

7. In a device of the character designated, the combination of a mixing chamber, means for introducing materials to be mixed in said chamber, means for sealing said chamber from within, means connected with said chamber for injecting compresed air through the bottom thereof to mix the materials and means for discharging said chamber of its contents by air pressure, for the purpose described.

8. In a device of the character designated, the combination of a mixing chamber, means for introducing materials to be mixed in said chamber, means for sealing said chamber from within, a pipe entering the bottom of said chamber, means for introducing compressed air through said pipe to mix the materials and means for introducing compressed air into the upper portion of said chamber, for the purpose of discharging the contents thereof.

9. In a device of the character designated, the combination of a mixing chamber, means for introducing materials to be mixed in said chamber, means for sealing said chamber, a pipe entering the bottom of said chamber, a deflecting plate opposed to the opening in said pipe, means for introducing compressed air through said pipe to mix the materials and means for introducing compressed air into the upper portion of said chamber, for the purpose described.

10. In a device of the character designated, the combination of a mixing chamber having an inverted conical bottom, a pipe entering the truncated end of said conical bottom, connecting with a discharge pipe and with a compressed air pipe, an inverted dish shaped deflector plate opposed to the opening in said pipe, a compressed air pipe entering the upper portion of said mixing chamber, valves controlling said pipe, means for introducing materials to be mixed in said chamber and means for sealing said chamber, for the purpose described.

11. In a device of the character designated, the combination of a mixing chamber, a discharge pipe and a pipe for conducting compressed air into said chamber a pipe entering the bottom of said mixing chamber and connecting with said discharge pipe and said compressed air pipe, said compressed air pipe also connecting with the upper portion of the chamber, a three way cock in said compressed air pipe and a valve in the discharge pipe, for the purpose described.

12. In a device of the character designated, the combination of a mixing chamber having an inverted conical bottom a discharge pipe, and a pipe for conducting compressed air into said chamber a pipe entering the truncated end of said conical bottom and connected with said discharge pipe and with said compressed air pipe, said compressed air pipe also entering the upper portion of said chamber, a three way valve in said compressed air pipe, a valve in the discharge pipe, a vent valve communicating with the upper part of the chamber and an inverted dish shaped deflector opposed to the opening in the pipe, which enters the truncated end of the conical bottom, for the purpose described.

13. In a device of the character designated, the combination of a mixing chamber, means for introducing compressed air into the bottom of said mixing chamber, a grating extending transversely across said chamber above the bottom thereof, means for introducing materials to be mixed into said chamber, means for sealing said chamber and means for discharging the contents of said chamber by air pressure, for the purpose described.

14. In a device of the character designated, the combination of a mixing chamber having an inverted conical bottom a discharge pipe, and a pipe for delivering compressed air into said chamber a pipe entering the truncated end of said conical bottom and connected with said discharge pipe and with said compressed air pipe, a compressed air pipe entering the upper portion of said mixing chamber, valves controlling said pipe, a transverse screen in said mixing chamber consisting of a series of flat metal bars arranged with their edges parallel to the longitudinal axis of the chamber, means for introducing materials to be mixed into said chamber and means for sealing said chamber, for the purpose described.

WILLIAM L. CANNIFF.

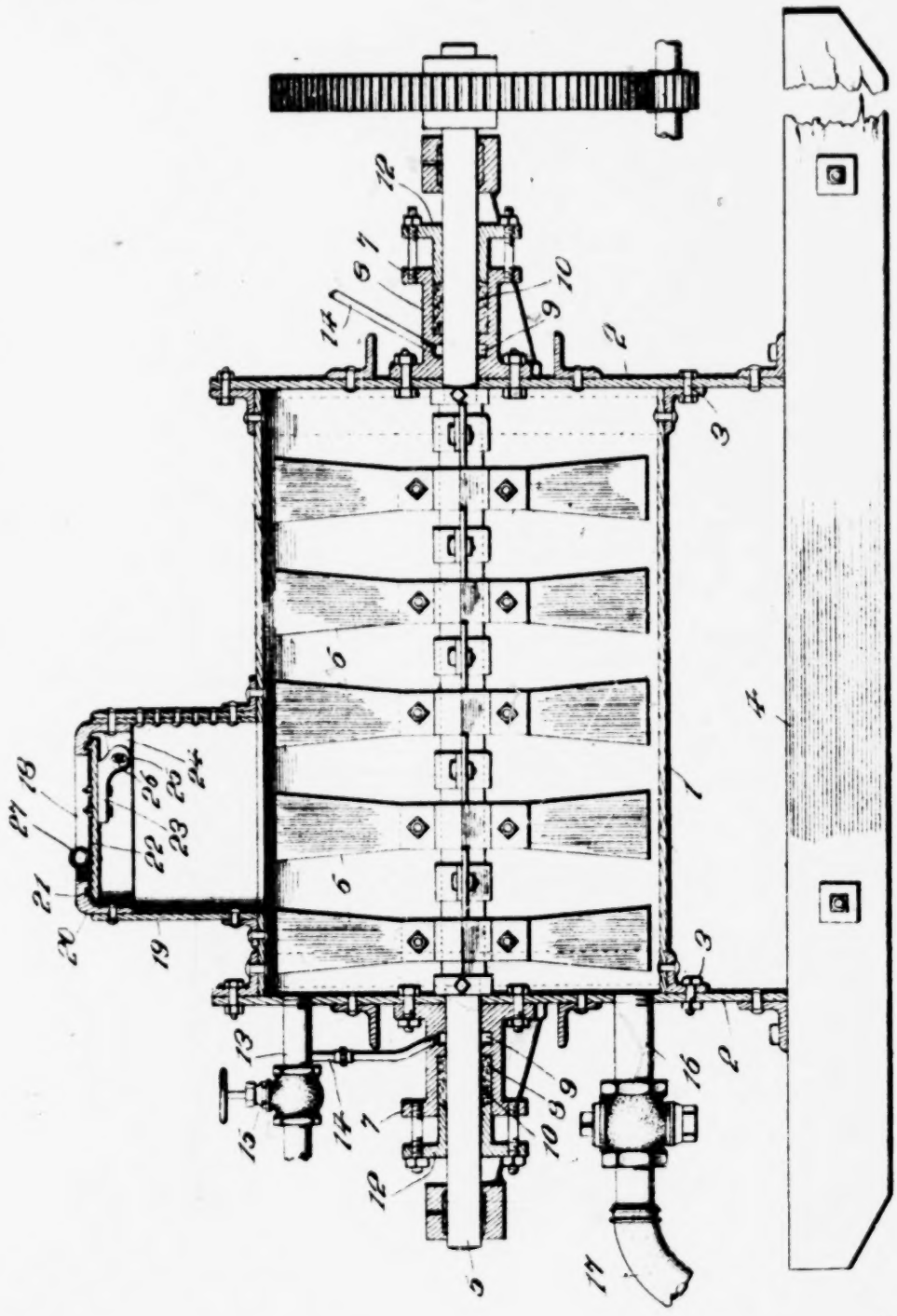
Witnesses:
D. W. GARDNER,
GEO. WM. MIATT.

W. McILVRID.

GROUT MIXER.

APPLICATION FILED NOV. 2, 1905.

958,421. **Patented May 17, 1910.**



Inventor

William McIlvrid,

Witnesses

Louis H. Schmidt.

By

Attorney

UNITED STATES PATENT OFFICE.

WILLIAM McILVRID, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO COCKBURN BARROW & MACHINE COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

GROUT-MIXER.

958,421. Specification of Letters Patent. Patented May 17, 1910.

Application filed November 2, 1905. Serial No. 285,657.

To all whom it may concern:

Be it known that I, WILLIAM McILVRID, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Grout-Mixers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention contemplates a new and efficient grout mixer, having special reference to means for effecting the thorough intermingling of the ingredients and so ejecting the grout after the mixing is completed that it may be applied directly from the mixer to the work for which it is intended, without an intermediate handling. Broadly stated these purposes are accomplished by the employment of motive fluid under pressure, and the invention further comprehends appropriate features of construction related to the association of the motive fluid with the mechanism.

In the accompanying drawing the figure shows in vertical longitudinal section a grout mixer embodying my invention.

Referring to the drawing 1 designates the cylinder shown horizontally disposed and rigidly supported between vertical end plates 2 and secured thereto as at 3, the plates being mounted upon a skid 4.

5 designates a rotary shaft extending through the cylinder and carrying paddles or blades 6 and having a band or gear wheel at one end. On the outer face of each end plate 2 is a stuffing box 7 for the shaft. These stuffing boxes are shown with their box or sleeve portions 8 bolted to the plates and formed with internal annular recesses or chambers 9 at points intermediate the cylinder and the receptacles 10 for the hemp or other soft packing, the receptacles, as usual in stuffing boxes, being formed by the sleeves and the followers 12, and the latter holding the packing in place.

A pipe 13 is tapped into the cylinder preferably near the top of one end thereof and passages 14 establish communication between this pipe and the annular recesses 9 in the stuffing boxes 7. The pipe 13 is provided with a valve 15.

16 designates an outlet pipe shown leading from the cylinder near the bottom of the head through which pipe 13 is introduced, the outlet pipe having a hose or flexible tubing 17 coupled to its outer end.

The cylinder is provided with a charging opening 18 shown at the top of a dome mounted upon the cylinder and forming a hopper 19. This opening is formed in an angle plate 20 having its vertical portion secured to the sides of the hopper and having an annular groove in the inner face of its horizontal portion in which groove is seated a rubber gasket 21. The opening is controlled by a door 22 having a depending portion 23 hinged to a bracket 24 secured to the side of the hopper 19, the bracket having a vertical slot 25 in which the pintle 26 of the hinge is movable. The door is provided with a handle 27, hopper 19 being of such depth that the door may be swung inward without interfering with the action of the blades.

The operation of the machine described is as follows:—The materials, usually consisting of cement, finely crushed stone, sand and water, are introduced into the cylinder through opening 18, the door 22 being opened downwardly by gravity. The rotation of the shaft is begun to start the agitation and mixture of the materials by the blades. After this has continued a moment, or it may be immediately after introducing the materials, the door 22 is closed and motive fluid, preferably compressed air at about 80 pounds pressure, is admitted to the cylinder through pipe 13; the outlet pipe 16 is opened and the hose 17 held to the work to which the grout is to be applied. The pressure of the air within the cylinder holds the door 22 to its seat, the rubber gasket 21 effectively sealing the opening. The slot 25 in the bracket 24 to which the door is hinged permits the pintle 26 to move vertically or tangentially to the curve described by the door in its swinging movement. This insures the door being evenly seated by the pressure of the air. The air enters through pipe 13 in the form of a strong blast directed toward the opposite end of the cylinder, from which it returns to pipe 16 which is the only outlet. In this travel the blast encounters the materials simultaneously with the stirring of the beaters and their combined actions immediately effect a thorough mingling of the materials by the violence of the agitation. So quickly is this accomplished that the admission of the air mechanically

be delayed once the materials have been introduced and as the outlet is always open while air is being admitted the finished grout is available at once. On account of the nature of the materials their agitation in the manner described occasions wear which the construction of the machine is designed to withstand. The machine illustrated would be impracticable if only the ordinary form of stuffing boxes were employed as the air pressure would force the sand and small particles of stone into the space between the shaft and its bearings and soon wear them out. To avoid this I have provided the annular recesses or chambers 9 in the stuffing boxes. When the air is admitted through pipe 13 it passes through passages 14 to these recesses and forms practically an air stuffing or packing, equalizing any portion of the air which might tend to pass out of the cylinder around the shaft, and preventing the small particles entering the bearing and preserving the soft packing from injury.

The advantages of my invention are apparent. The readiness with which the finished grout is made and applied without requiring, as a separate step, its removal from the cylinder by hand or otherwise, and the effective mechanism employed have rendered the machine available for use in the building of sea walls, foundations, etc., since the grout is expelled with such force that it may be thrown in a stream to some distance from the operator.

I claim as my invention:—

1. In a mixing machine, a receptacle for the materials, a rotary shaft extending therethrough, blades on said shaft, a pipe conducting motive fluid under pressure to said receptacle, a packing box having a chamber surrounding said shaft without said receptacle, and a passage establishing communication between said pipe and said chamber.

2. In a mixing machine, a receptacle for the materials, a rotary shaft extending therethrough, blades on said shaft, a pipe conducting motive fluid under pressure to said receptacle, a sleeve surrounding said shaft without said receptacle, an internal annular recess being formed in said sleeve, and means for establishing communication between said pipe and said recess.

3. In a mixing machine, a receptacle for the materials, a rotary shaft extending therethrough, blades on said shaft, a stuffing box on said shaft without said receptacle and containing soft packing, an internal annular recess being formed in said box intermediate said soft packing and said receptacle, a pipe designed to conduct motive fluid under pressure to said receptacle, and a passage establishing communication between said pipe and said recess.

4. In a grout mixer, the combination with the casing having a rotary shaft extending therethrough, blades on said shaft, means for rotating said shaft, a dome on said casing having a charging opening, and an inwardly swinging door mounted in said dome and controlling said opening, of a pipe entering said casing and adapted to convey a charge of compressed air into said casing to co-act with said blades in effecting the mixing of materials and to hold said door to its seat, and an outlet pipe adapted to convey the mixed material from said casing under the pressure of the air blast.

5. In a grout mixer, the combination with the casing having a rotary shaft extending therethrough, blades on said shaft, means for rotating said shaft, a dome on said casing having a charging opening, an inwardly swinging door mounted in said dome for controlling said opening, and means permitting said door to move tangentially to the curve described in its swinging movement, of a pipe entering said casing and adapted to convey a charge of compressed air into said casing to co-act with said blades in effecting the mixing of materials and to lift said door and hold it elevated against its seat, and an outlet pipe adapted to convey the mixed materials from said casing under the pressure of the air blast.

6. In a mixing machine, a receptacle for the materials, a hopper having a charging opening, an inwardly-swinging door located wholly within the hopper and designed to be normally held seated over said charging opening by internal pressure, rotary blades within said receptacle, means for supplying a fluid under pressure to said receptacle, and means for conveying the mixture away from the latter.

7. In a grout mixer, the combination with the casing having a charging opening and an outlet, a rotary shaft extending therethrough, said casing having a packing sleeve secured to the outer face of one of its ends through which sleeve said shaft extends, said sleeve having a recess surrounding said shaft, blades on said shaft within said casing, and means for rotating said shaft, of a pipe entering said casing and adapted to convey a charge of compressed air into said casing, and a tubular connection between said pipe and said recess, for the purpose stated.

8. In a grout mixer, the combination with the casing having a charging opening and an outlet, a rotary shaft extending therethrough, said casing having a packing sleeve secured to the outer face of one of its ends through which sleeve said shaft extends, said sleeve having a packing receptacle, soft packing therein, and a gland for compressing said packing, said sleeve also having a recess surrounding said shaft, blades on said shaft within said casing, and means for

rotating said shaft, of a pipe entering said casing and adapted to convey a charge of compressed air into said casing, and a tubular connection between said pipe and said recess, for the purpose stated.

9. In a grout mixer, the combination with the mixer casing having a charging opening, of means for mixing materials in said casing, means for conducting air under pressure into said casing, means for sealing said charging opening held seated by said air pressure within the casing, and means for ejecting the mixed materials from said casing by the pressure of the air.

10. In a grout mixer, the combination with the mixer casing having a charging opening, of an inwardly swinging door controlling said opening, means for mixing materials in said casing, a pipe entering said casing and adapted to convey a charge of compressed air into said casing to hold said door to its seat, and an outlet pipe leading from said casing through which the mixed materials are ejected by the pressure of the air.

11. In a grout mixer, the combination with the mixer casing having a charging opening, of an inwardly swinging door controlling said opening, means permitting said door to move tangentially to the curve described in its swinging movement, means for mixing materials in said casing, a pipe entering said casing and adapted to convey a charge of compressed air into said casing to force said door against its seat, and an outlet pipe leading from said casing through which the mixed materials are ejected by the pressure of the air.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

WILLIAM McILVRID.

Witnesses:
GRAFTON L. McGILL,
ALICE LIND.

[fol. 417] IN UNITED STATES DISTRICT COURT

OPINION—NOV. 8, 1926

AUGUSTUS N. HAND, District Judge:

This is an attempt to retry the issues determined in the case of Concrete Mixing & Conveying Co. v. Ulen Contracting Corporation, 12 Fed. (2d) 929; 931. The main reliance is upon a prior use which is alleged to have occurred over twenty years ago. No contemporary sketches are produced and the two witnesses attempt to describe from memory a mechanism which was not used except on two occasions. If such a practical device as that of the patent in suit had been employed, it is hardly likely that a contractor used to conducting large enterprises would not have sought a patent, or at least have taken advantage of something which in recent years has met with signal success. I am not satisfied that the defendants have established the prior use.

Aside from this new proof the defendants rely on the old contention made in the earlier case that their device is purely kinetic. I do not regard it as theoretically probable that masses of concrete containing gravel stones of a diameter running to one and a half inches can be blown long distances by compressed air and I think the testimony of Mr. Ray that he could detect the passage of a series of [fol. 418] slugs when he put his ear to the outlet pipe is the more probable testimony. Moreover, if air were floating the concrete it would be bound to pass through the pipe and the pressure would be so rapidly reduced that the heavier portions would be left in the pipe.

All of the claims were infringed until the Powers-Kennedy structure was impaired in the hope of avoiding infringement. After ceasing to introduce pressure behind the mass of concrete by means of closing the upper valve, it is true that some of the claims are not met, yet some of them are. There is undoubtedly a pressure behind the mass in defendants' machine far greater than ordinary air pressure and varying according to the freedom with which the air in the outlet tube is passing through it. As each slug was discharged, the pressure in the discharge pipe would lessen and the pressure behind the mass amounting

to something like thirty pounds would force a further slug into the outlet. If this were not so, the high pressure through the discharge pipe would hold back the concrete.

As for the point raised that patents for kinetic devices are pertinent prior art, it is answered by the fact that neither the patent in suit nor the defendants' device are kinetic in operation.

The complainant is entitled to an interlocutory decree with the usual reference, the same to be settled on notice.

A. N. H., D. J.

[fol. 419] In United States District Court

Interlocutory Decree—Nov. 11, 1926

This cause came on to be heard at this term at final hearing on pleadings and proofs, and was argued by counsel for both parties; and now after due consideration thereof, it is ordered, adjudged and decreed as follows:

1. That the plaintiff is the sole an exclusipe owner of United States Letters Patent No. 1,127,660 for Method of and Apparatus for Transporting and Treating Concrete granted February 9th, 1915, to John H. McMichael, assignor to the plaintiff, the same being the letters patent in suit, and also of all claims and demands in law and in equity for any and every infringement thereof.

2. That the said Letters Patent No. 1,127,660 are good and valid in law, and particularly as to claims 2, 4, 6, 17, 21, 22, 28, 34 and 35, (plaintiff having voluntarily waived a decree under the other claims recited in the stipulation between the parties in which the claims relied on are specified), and that the said John H. McMichael was the original, first and sole inventor and discoverer of the improvements described and claimed in the said Letters Patent and set forth in the specification thereunto annexed.

3. That the defendants, Powers-Kennedy Contracting Corporation and Anthony G. Fleck have infringed the said [fol. 420] Letters Patent and particularly claims 2, 4, 6, 17, 21, 22, 28, 34 and 35 thereof, and the exclusive rights of the

plaintiff thereunder by making and causing to be made, and using apparatus and employing a method for elevating and transporting concrete embodying and practicing the invention of said Letters Patent and the improvements patented as aforesaid, as charged in the Bill of Complaint herein.

4. That a perpetual injunction issue in this suit against the said defendants, restraining them, and each of them, their officers, agents, servants and employees, and all persons acting under or for them, from directly or indirectly making, selling, using, or otherwise disposing of apparatus for elevating and transporting concrete or utilizing or practicing any method for elevating and transporting concrete embodying or realizing the invention or improvements of said Letters Patent No. 1,127,660.

5. That the plaintiff do recover of the defendants the profits, gains, and advantages which the said defendants, and each of them, have realized, or which have arisen or accrued to them on account of or in connection with the said infringement, and the damages resulting from the said infringement, together with the costs of this suit to be taxed.

6. That it be referred to William Parkin, of the City, County and State of New York, as Master pro hac vice, to ascertain, take and state and report to the court an account of the extent and circumstances of the manufacture, sale [fol. 421] and use and employment of the said method and apparatus, embodying said invention and improvements as described in and secured by said Letters Patent No. 1,127,660, the number of such apparatus made, sold, used and employed and the quantity of concrete placed by the defendants and each of them with such apparatus, and by the use or employment of it and the said method, and also the gains, profits and advantages which the said defendants and each of them has received or which have arisen or accrued to them, from the said infringement, and the damages which the plaintiff has suffered by reason of said infringement, the matter of the increase of damages as prayed in the bill of complaint, to be left until the coming in of the said Master's report.

7. That the plaintiff on such accounting have the right to cause the examination of the defendant Fleck, and the officers, agents and employees of the corporate defendant ore tenus or otherwise, and also to the production of their books, records, accounts, vouchers and documents, and that they attend for such purpose, before said Master, from time to time, as said Master shall direct, and file with the said Master an account of the said profits, gains and advantages in detail, giving the items, dates and details and the extent of the manufacture, sale, use and employment of the said apparatus and method and the quantity and amount of concrete placed, the number of apparatus used, and the manner in which the same were used, and such other informa-
[fol. 422] tion relating thereto as said Master shall direct.

Augustus N. Hand, U. S. D. J.

In United States Disrtict Court

Stipulation re Decree, etc.—March 17, 1927

1. It is hereby stipulated and agreed by and between the parties hereto through their respective counsel, that the plaintiff's damages and the defendants' profits, and the amount to be recovered by the plaintiff, which plaintiff is entitled to recover from the defendants herein, is, and is hereby fixed at the sum of Twenty-one thousand ($21,000) dollars exclusive of costs; that the accounting proceedings herein before Wm. Parkin, Esq., Special Master, shall be terminated forthwith, and the said sum fixed as the amount which would have been awarded to the plaintiff on the said accounting by the said Master; and that no further or other accounting shall be had herein, but that this stipulation and agreement shall be in lieu of any such accounting and any report or award and confirmation of the same by the court.

2. It is further stipulated and agreed that the plaintiff may enter a final decree herein in the usual form, a copy
[fol. 423] of which is hereto annexed, awarding it the said sum of Twenty-one thousand ($21,000) dollars as damages and profits to be recovered from the defendants, with costs

to be taxed, and have judgment and execution therefor, with the same force and effect as if the said sum had been awarded by the Master and his award confirmed by the court, said decree to be entered forthwith; but that the defendants shall have thirty days from the entry of such decree within which to take an appeal therefrom to the United States Circuit Court of Appeals for the Second Circuit, and give the supersedes bond herein provided for, but said appeal shall not question the amount of damages and profits.

3. It is further stipulated and agreed that the defendants shall within thirty days from the entry of the said decree take an appeal therefrom to the U. S. Circuit Court of Appeals for the Second Circuit, and shall as a condition prerequisite to the allowance of such appeal furnish, serve and secure the approval of a bond with sufficient surety in and for the said amount and sum of Twenty-one thousand ($21,000) dollars, to secure the payment of that amount and costs if the decision of the District Court herein is affirmed by said Court of Appeals in whole or in part, so that one or more of thec laims of the patent in suit is found to be valid and infringed, said bond to act as a supersedeas bond until the Mandate of the said Court of Appeals is issued; and said amount, and any judgment that may be [fol. 424] entered therefor in this suit to be paid, with interest from the date hereof, forthwith, and the said bond to guarantee such payment. The right to appeal after said thirty days is hereby waived.

4. It is hereby stipulated and agreed by and between the parties hereto, through their respective counsel, that immediately upon the approval and filing of the aforesaid supersedeas bond for Twenty-one thousand ($21,000) dollars, interest and costs, plaintiff will without delay cooperate with defendant in securing an Order from the Court, and otherwise properly moving, to release the attachment or other lien which plaintiff has caused to be filed with the Controller of the City of ew York, against the moneys now due and payable to defendant upon its contract with the City of New York for the construction of the Forty-second Street Subway, the purpose being to re-

lease said moneys due defendant as soon as plaintiff is protected by the filing of the supersedeas bond.

Dated March 17th, 1927.

Stephen J. Cox, Plaintiff's Solicitor. John D. Morgan, Alan M. Johnson, Defendants' Solicitor.

[fol. 425] IN UNITED STATES DISTRICT COURT

FINAL DECREE—March 19, 1927

An interlocutory decree having been entered herein November 12th, 1926, adjudging Letters Patent in suit No. 1,127,660 valid and infringed as to claims 2, 4, 6, 17, 21, 22, 28, 34 and 35 thereof, directing the issuance of a perpetual injunction against the defendants for said infringement, awarding damages and profits to the plaintiff against the defendants for said infringement and cost, and directing an account of said profits and damages, and the parties hereto having waived further accounting proceedings and agreed upon the sum of Twenty-one thousand ($21,000) dollars as the amount of said costs and profits to be recovered by the plaintiff against the defendants and that a final decree for the same may be entered forthwith, as set forth in the annexed stipulation, filed and approved herewith, it is

Ordered, adjudged and decreed that the said defendants pay to the said plaintiff and the said plaintiff recover of the said defendants the said sum of Twenty-one thousand ($21,000.) dollars, the amount of plaintiff's damages and defendants' profits, together with the costs of this suit to be taxed, and that the plaintiff have judgment and execution therefor against the defendants.

Dated March 19, 1927.

John C. Knox, U. S. D. J.

[fol. 426] Approved as to form.

Stephen J. Cox, Plaintiff's Solicitor. (Sig.) John D. Morgan, Alan M. Johnson, Defendants' Solicitors.

In United States District Court

Petition for Appeal and Order Allowing Same—April 5, 1927

The above named defendants, conceiving-themselves aggrieved by the final decree made and entered on the 21st day of March, 1927, do hereby appeal from said final decree to the United States Circuit Court of Appeals for the Second Circuit, for the reasons specified in the assignment of errors filed herewith, and they pray that this appeal may be allowed, and that a transcript of the record, proceedings and papers upon which said decree was based may be sent to the United States Circuit Court of Appeals for the Second Circuit.

John D. Morgan, Solicitor for Defendants. Alan M. Johnson, Counsel for Defendants.

[fol. 427] Allowance of Appeal

The foregoing appeal is allowed.
April 5, 1927.

F. A. Winslow, U. S. District Judge.

In United States District Court

Assignment of Errors—April 5, 1927

It is respectfully submitted that:

1. The trial Court erred in holding that:

"This is an attempt to retry the issues determined in the case of Concrete Mixing and Conveying Co. vs. Ulen Contracting Corporation, 12 Fed. (2) 929; 931."

for the—

(a) Alleged infringing structure is radically different;

(b) The mode of operation covering upper and lower air ports to admit air under pressure above the mass of concrete in the blower, to blow slugs or cylinders of dry concrete into the path of the lower air jet, which jet broke

them off and carried them, as slugs or cylinders along the pipe, like spit balls in a boy's bean shooter, was entirely [fol. 428] different from defendants' structure, where only the lower air jet was employed, the extremely wet concrete dropping by gravity and being carried along in suspension by the air in the pipe; this method being known in this case as the kinetic method, like the prior art.

(c) The prior patented art is different (The Smith patent 122,498 for blowing concrete by air under pressure was not before the Court in the Ulen suit, nor was the Smith patent 122,497 for liquid concrete that would flow through a pipe, as well as other prior patents cited in this suit).

(d) The prior use testimony in this suit was not in the Ulen suit.

2. That the Trial Court erred in holding, in effect that the patent in suit for blowing concrete was a pioneer patent, and therefore entitled to a broad range of equivalents, when the evidence in this suit (not submitted in the prior Ulen suit) shows that it was old in the prior Smith patent 122,498 to blow liquid concrete uphill through pipes:

"The liquid composition, after it has been thoroughly mixed with the pebbles, gravel or broken stone flows off from the mixer * * *. When it is necessary to force the liquid (concrete) uphill or to carry it quickly or in larger quantities than usual, or through long pipes, * * * [fol. 429] I employ a forcing apparatus to propel it through the pipes, the same consisting preferably of a tight chamber F, capable of resisting great pressure, into which the liquid (concrete) flows from the mixer, and a pipe f, by which steam or compressed air can be introduced into the chamber F, upon the liquid to force the latter, by pressure into the pipe D."

3. That the Trial Court erred in not holding the patent in suit invalid in view of this Smith patent 122,498.

4. That the Trial Court erred in not holding that in view of this Smith patent 122,498, as well as the Smith patent 122,497 for very wet liquid concrete that would flow through a pipe (such as defendants use) that the patent in suit must be limited, as it was in the Ulen suit, to propelling slugs or

cylinders of comparatively dry concrete in the discharge pipe, in the same manner as "spit balls" are propelled in a boys pea shooter.

5. That the Trial Court erred, therefore, in not holding that defendants' blower, working on a different principle and with wet liquid concrete, did not infringe the patent in suit.

6. That the Trial Court erred in totally ignoring, and giving no force or effect to these two Smith patents 122,498 and 122,497.

[fol. 430] 7. That the Trial Court erred in holding:

"The main reliance is upon a prior use which is alleged to have occurred twenty years ago."

(The prior use was one of the defenses but not the main defense. It, however, alone is sufficient to invalidate the patent in suit.)

8. That the Trial Court erred in holding that:

"I do not regard it as theoretically probable that masses of concrete containing gravel stones of a diameter running to one and a half inches can be blown long distances by compressed air * * *."

In making this holding the Trial Court ignored—

(a) The matter of common knowledge that air in a tornado or cyclone, where it is not confined as for example in a pipe, will carry large branches of trees, large boards, bricks from chimneys, stones, roofs, etc., and, in fact, all kinds of objects hundreds of yards, and even the smaller objects a mile or more.

(b) The article by Mr. Kirkland, the Chief Engineer of the plaintiff who had had over five (5) years experience with plaintiff's machines prior to writing the article:

"As the portions of the batch drop into the lower air stream, which has a velocity of about 5,000 feet per minute, these portions are carried along in suspension much as dust [fol. 431] is carried along in a storm except that the particles are much closer together."

(Article by Mr. Kirkland, their Chief Engineer in Journal of Western Society of Engineers, May, 1918, Defendants' Exhibit H.)

(c) This documentary evidence, by their own chief engineer, given several years before any suit was brought on the patent in suit, or contemplated, that the concrete of the patent in suit was conveyed in suspension in the air.

(d) The same article by their Chief Engineer, Mr. Kirkland on pages 334 and 335 of the Journal of Western Society of Engineers of May, 1918, that limestone screenings and sand were blown in "much as dust is carried along in a storm,"—

"Where packing was used it was placed with the pneumatic machine. The packing consisted of a (dry) mixture of 75 per cent limestone screenings and 25 per cent sand. This was blown in filling the cavity completely and packing it tightly so that the weight or any pressure from rock settlement was evenly distributed over the barrel of the arch through the packing."

(This is the flotation or kinetic method, used by defendant and common in the prior art.)

[fol. 432] (e) The testimony of eminent engineers called as witnesses by the defendant as well as the testimony of Mr. Dyer, the patent expert, that the method employed by defendant was, in fact, the flotation or kinetic method.

9. The Trial Court erred in holding that:

"All the claims were infringed until the Powers-Kennedy structure was impaired in the hope of avoiding infringement."

(There is no testimony upon which to base such a holding.)

10. The Trial Court erred in not holding, as testified to by the witnesses, that no top air was used for several years prior to the beginning of this suit, and that it worked better, with the liquid concrete employed by the defendant, after the top air was discontinued.

11. That the Trial Court erred in holding that the prior art for kinetic devices cited was not pertinent for the reason that:

"* * * neither the patent in suit nor the defendants' device are kinetic in operation."

This in the face of the article written by Mr. Kirkland, their Chief Engineer, years before this suit was instituted:

"* * * these portions are carried along in suspension [fol. 433] much as dust is carried in a storm except that the particles are much closer together."

(Defendants' Exhibit H) and also the testimony of defendants' technical and skilled witnesses.

12. The Trial Court erred in failing to apply the law as laid down by the United States Supreme Court in U. S. Concrete Appliance Company vs. Gomery (44 Supreme Court 404), and by the Circuit Court of Appeals of this Circuit in Ransom Concrete Machinery Company vs. United Concrete Company, 177 Fed. 413.

13. The Trial Court erred in not holding that during the prosecution of the McMichael application in the Patent Office it was expanded to include new matter not in the original disclosure.

14. That the Trial Court erred in not holding the patent in suit invalid in view of the testimony of prior public use supported by the documentary evidence of the Journal of Western Society of Engineers for May 1918, Defendants' Exhibit H.

15. That the Trial Court erred in disregarding the testimony of prior public use because "No contemporary sketches are produced * * *" when documentary evi- [fol. 434] dence, Journal of Western Society of Engineers of May 1918, Exhibit H, was produced, and the law in this Circuit, as held by the Circuit Court of Appeals, that no "Contemporary sketches" are necesasry if the Court is satisfied that the witness is competent and is telling the truth:

(a) National Casket Co. vs. Stolts, 157 Fed. 392;
(b) National Casket Co. vs. Stolts, 204 Fed. 983;
(c) Crone vs. Gibson Co., 247 Fed. 503.

16. That the Trial Court erred in not holding the patent invalid.

17. That the Trial Court erred in not holding that the defendants' structure did not infringe the patent in suit.

18. That the Trial Court erred in ordering costs to be taxed against the defendants.

John D. Morgan, Solicitor for Defendants. Alan M. Johnson, Counsel.

[fol. 435] Citation, in usual form, showing service on Stephen J. Cox, omitted in printing.

[fol. 436] In United States District Court

Stipulation as to Record

It is hereby stipulated and agreed between counsel for the parties hereto:

1. That the annexed præcipe shall be the præcipe herein and that the annexed order may be entered forthwith.

2. That the exhibits and portions of the exhibits offered at the hearing, and not specified in the said præcipe shall be treated as physical exhibits for the purpose of avoiding expense of reproduction in the printed transcript of record on appeal, and shall be produced by appellants' counsel at the argument in the Court of Appeals.

3. That appellants' counsel shall also produce and furnish three complete copies of the transcript of the record on appeal in the said Ulen suit (Exhibit D and also containing exhibits 6, 7, 8 and 9 and parts of other exhibits) at the argument in the Appellate court herein, for the use of the Judges thereof.

4. That the transcript of record on appeal herein shall contain the testimony as given at the hearing in the form [fol. 437] of question and answer, and need not be reduced to narrative form, the court approving the same.

Dated, June 6, 1927.

S. J. Cox, Plaintiff's Solicitor. John D. Morgan, Alan M. Johnson, Defendants' Solicitors.

IN UNITED STATES DISTRICT COURT

ORDER AS TO RECORD

And now on this — day of March, 1927, upon motion of the solicitor for defendant, and upon the filing of the attached præcipe indicating the portions of the record to be incorporated in the transcript on appeal which has been taken, and upon the stipulation of the solicitors for the plaintiff and defendants, it is

Ordered, that the portions of the record enumerated in the attached præcipe be incorporated into the transcript on appeal, the exhibits and portions of exhibits not incorporated to be treated as physical exhibits and produced at the argument in the Appellate Court by appellants' counsel, and that the testimony as given at the final hearing need not be reduced to narrative form but may be given in the transcript of record on appeal in the form of question and answer.

F. A. Winslow, U. S. District Judge.

[fol. 438] IN UNITED STATES DISTRICT COURT

[Title omitted]

PRÆCIPE FOR TRANSCRIPT OF RECORD

And now come the defendants, having filed their appeal herein, and hereby designate the following portions of the record to be incorporated into the transcript on the appeal which has been allowed, to wit:

1. Bill of Complaint, as amended by order April 29, 1926.

1a. Order of June 19, 1926, amending answer, and memorandum of Hon. John C. Knox thereon.

2. Answer as amended by order June 19, 1926.

2a. Plaintiff's interrogatories and defendants' answers omitting cuts in exhibits attached thereto (exhibit 3 at hearing being one of them included hereinafter).

[fol. 439] 3. Minutes of the trial in the District Court as agreed upon by counsel.

4. Exhibit No. 1 stipulation providing for uncertified copies of the patent in suit and other patents and also for the use of copies from the Ulen suit without certification, etc.

5. Exhibit No. 2 copy of the patent in suit, No. 1,127,660.

5a. Exhibits 3, 4 and 5.

6. The following patents not in Exhibit D, the Transcript of the Record in the Ulen suit:

122,497, Smith, January 2, 1872.
122,498, Smith, January 2, 1872.
267,318, Beach, November 14, 1882.
408,201, Wallace, July 30, 1889.
599,055, Davidson, February 15, 1898.
873,345, Canniff, December 10, 1907.
958,421, McIlvrid, May 17, 1910.

(It is stipulated that the application for this patent was filed November 2, 1905.)

6a. Pages 13, 102 and 103 of Plaintiff's Exhibit 19, introduced in evidence at the end of the final hearing herein.

7. Opinion of Hon. A. N. Hand, District Judge.

8. Interlocutory decree.

[fol. 440] 9. Stipulation dated March 17, 1927, that final decree may be entered, recovery contingent on decision of U. S. Circuit Court of Appeals.

10. Final decree.

11. Petition for Appeal and Order allowing same.

12. Assignment of Errors.

13. Citation.

14. Præcipe and Order.

15. The amended stipulation.

John D. Morgan, Alan M. Johnson, Defendants' Solicitors.

IN UNITED STATES DISTRICT COURT

STIPULATION AS TO CERTAIN EXHIBITS, ETC.

It is stipulated by and between the respective parties with the consent of the Circuit Court of Appeals, that Defendants' Exhibit D, which is the printed record on appeal in Ulen suit, on appeal to this Court of Appeals, on the same patent, portions of which were put in evidence by the plaintiff in this litigation, need not be again printed, the Court [fol. 441] of Appeals to be provided by the appellants with three copies of said printed record, including those now on file in said Court if available. The official title of said suit is Concrete Mixing and Conveying Company, Plaintiff-Appellee, vs. Ulen Contracting Corporation and Shandaken Tunnel Corporation, Defendants-Appellants.

It is further stipulated, by and between the parties, with the consent of the Court of Appeals, that the file wrapper of the patent in suit and such copies of the prior art and exhibits as are printed in said printed record need not be again printed in the transcript of the record on this appeal on the same patent.

Stephen J. Cox, Solicitor for Plaintiff. John D. Morman, Solicitor for Defendants.

New York, March 28, 1927.

Approved. Martin T. Manton, U. S. Circuit Judge. March 28th, 1927.

[fol. 442] IN UNITED STATES DISTRICT COURT

STIPULATION RE RECORD

It is hereby stipulated and agreed, that the foregoing is a true transcript of the record of the said District Court in the above-entitled matter as agreed on by the parties.

Dated June —, 1927.

John D. Morgan, Attorney for Appellants. Stephen J. Cox, Attorney for Appellees.

[fol. 443] Clerk's certificate to foregoing transcript omitted in printing.

UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT, OCTOBER TERM, 1927

No. 131

Argued March 6, 1928. Decided July 17, 1928

CONCRETE MIXING & CONVEYING COMPANY, Plaintiff-Appellee,

v.

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, Defendants-Appellants

Appeal from the District Court of the United States for the Southern District of New York

Before Manton, L. Hand, and Swan, Circuit Judges

Appeal from the District Court of the United States for the Southern District of New York.

Suit for infringement of claims Nos. 2, 4, 6, 17, 21, 22, 28, 34, and 35 of patent No. 1,127,660, to McMichael, granted February 9, 1915, for "methods of and apparatus for transporting and treating concrete." The defendant corporation was the builder of the Queensboro Crosstown subway in Forty-Second street, New York City, and used in this work a machine for conveying and placing concrete by compressed air, which is alleged to infringe the patent in suit. The individual defendant furnished the machine to the corporation. From a decree finding the claims valid and infringed, and awarding damages to the plaintiff, the defendants have appealed. Affirmed.

John D. Morgan, of New York City (Alan M. Johnson, of New York City, of counsel), for appellants.

Stephen J. Cox, of New York City (Williams, Bradbury, McCaleb & Hinkle, of Chicago, Ill., of counsel), for appellee.

SWAN, Circuit Judge:

These same claims were held valid and infringed by the same District Judge in Concrete Mixing & Conveying Co. v. Ulen Contracting Corp., 12 F. (2d) 929. We affirmed that decree without opinion. 12 F. (2d) 931. A detailed description of the patent in suit need not be here repeated. Subsequently Judge Bourquin held the patent invalid in Concrete Mixing & Conveying Co. v. R. C. Storrie & Co. (D. C.) 23 F. (2d) 131. It is urged that, because of his decision and the case of Concrete Appliance Co. v. Gomery, 269 U. S. 177, 46 S. Ct. 42, 70 L. Ed. 222, as well as because of new matter introduced in this record, we should reconsider the validity of the patent.

The new matter is, of course, open to us and will be dealt with hereafter. The Supreme Court case, however, contains nothing, in our opinion, which casts doubt upon the correctness of the Ulen decision; in fact, it was before us when that decision was made. It holds, affirming the judgment of the Circuit Court of Appeals for the Third Circuit in 291 F. 486, that the Callahan patent, which covered an apparatus operating on the gravity principle for distributing "wet" concrete, was invalid, because it merely made use of known methods and appliances for the convenient handling of this recently accepted building material. The appellants' argument runs that, since the Supreme Court emphasizes that old apparatus used for distributing water, grain, or coal was readily adaptable for handling concrete, so the prior art patents for blowing sand, grain, or grout, which in the Ulen Case were held not to invalidate McMichael's patent, should now be deemed complete anticipations of it. But the Gomery decision does not rest merely on the assumption that apparatus for coal and grain could have been used for wet concrete without inventive thought. Adaptations of old carriers to handle concrete were shown to have been frequently made for several years before the application for the patent there in suit. The idea was already of common knowledge and was being applied generally. Therefore Callahan's adaptation was not an invention.

But that is a very different situation from the one before us in the Ulen Case, where nobody before McMichael had ever used a pneumatic apparatus to transport concrete. The Warren and Farnham sand-blast machines (patents No. 671,303 and No. 747,396) could not have been so used without increasing the size of the discharge pipes and cutting off the sand-blast nozzles. To do this was to make a new machine, and one who thought of doing it would have had a new and inventive idea; that is, that of blowing concrete, which had not been done before. When that is so, the physical change in the apparatus need be very little to sustain a patent. The only reason why a new use is not patentable is that the law grants patents only for new things, not for new ideas. Similarly Goldie's machine (patent No. 707,840) for blowing cement could not, so far as appears, have been used as it stood for concrete, and never was so used. The Supreme Court case does not require us to reconsider the validity of McMichael's patent.

In the suit against Storrie & Co., Judge Bourquin seems to have relied to some extent, at least, upon patents which were not in the record in the Ulen Case and are not now before us. But whatever the court as now constituted might think of the correctness of our former ruling, it is our duty to follow it, unless new evidence raises questions of the patent's validity not previously considered. See Cortelyou v. Charels E. Johnson & Co., 145 F. 933, 934 (C. C. A. 2); Crier v. Innes, 170 F. 324 (C. C. A. 2).

The new evidence of the patent art upon which appellants rely to distinguish the Ulen decision includes two patents granted in 1872 to W. H. Smith. No. 122,497 is for an improvement in concrete pavements and claims concrete "prepared for use in a liquid or semiliquid condition, capable of flowing in pipes and running into molds." No. 122,498 discloses a machine for mixing liquid concrete and conveying it by a discharge pipe from the mixer to the spot where it is to be laid. The concrete is to flow through the discharge pipe by gravity, or as an alternative, after flowing by gravity through a small winding passage into a chamber, F, is to be forced into the discharge pipe by the passage of steam or compressed air admitted into the chamber above the mass of the concrete. The chamber has a flat bottom of large area relative to the size of the discharge pipe, the outlet of which

opens into the center of the bottom. While this machine discloses the idea of forcing concrete through a pipe by compressed air, whether it was practically operable may well be daubted. It would seem that a large quantity of the concrete, or at least the stones of which it is partly composed, would necessarily accumulate upon the flat bottom of the chamber. In any event, it was very different from McMichael's device, which injects air into the concrete at its entrance into the discharge outlet. It cannot be regarded as an anticipation.

Nor can the argument that the patent in suit is limited to "dry" concrete, as distingushed from defendants' "wet" concrete, prevail. It declares on page 3, line 55: "It is equally well adapted for the treating and handling of a mass containing a considerable excess of water, in case such an excess is for any reason found desirable." The other new references in the Patent Office (Canniff, McElvrid, Beach, and Davidson) we regard as less persuasive than those which were passed upon in the Ulen Case.

The new defense of prior use was held by the District Court not sufficiently proved, and with this we agree. This use was of a machine which Artingstall and Fanning said that they saw laying a concrete floor in 1903, subsequently changing the date to 1904. That was 22 years before they gave their testimony, and there was no documentary corroboration of any kind. It is true that in 1918 Artingstall described very generally before a meeting of engineers that this process was practiced in 1903, but that cannot be deemed documentary corroboration. Fanning says the machine was also used in one section of a tunnel in Chicago in 1903, and was apparently abandoned as too expensive. It is one thing to say that a continuous use to date may be found on oral testimony to have started at a given time, and quite another to say that such testimony is enough when it describes only a casual use, abandoned thereafter, and never entering into the art until after the patent in suit was applied for, an interval of nearly 3 years. Such casual and abandoned uses do not contribute to the stock of knowledge which makes up the art. If we may invalidate a patent upon such prior uses, so proved, no patent would be safe. A prior use, such as constitutes an anticipation, was not proven with the degree of certainty which the courts re-

quire. See Deering v. Winona Harvester Works, 155 U. S. 286, 300, 15 S. Ct. 118, 39 L. Ed. 153; Internat. Cork Co. v. New Process Cork Co. 6 F. (2d) 420, 424 (C. C. A. 2); De Laski & Thropp Co. v. Fisk Rubber Co., 203 F. 986 (C. C. A. 1).

Much argument has been expended in an effort to establish just how the plaintiff's and defendants' machines operate in sending the concrete through the discharge pipe—the plaintiff contending that both discharge it in a succession of slugs or pistons, while the defendants claim that both, or at least theirs, operate kinetically and float the materials in the air, just as sand or grain is carried in floatation. To us the dispute seems irrelevant. The patent says nothing which commits the patentee to the slug method of operation. The theory is built upon the use of the phrase "submasses," as in lines 72 and 89, page 2, where it is said that the lower air jet "engages with the submasses to push them along." But this cannot mean solid "slugs," for on the same page, lines 92-99, the effect is said to be thoroughly to commingle all the ingredients and insure a better mix. Again, at line 113, page 3: "The delivery pipe itself becomes a mixing chamber, wherein pneumatic mixing is effected or continued." And see, also, line 86, page 3. Such statements necessarily forbid the notion of solid slugs. All that is meant by "submasses" is the portions that descend into the discharge pipe, 14, and by their descent are separated from the general mass in the main chamber 1. It is a synonym for "portions of the mass as they move toward and into the discharge duct." Line 53, page 2.

Moreover, several of the claims in suit are for the apparatus, or machine, and if they are infringed it is enough for the purposes of this suit, whether the machine discharges its concrete kinetically or in successive slugs. Neither theory is entirely persuasive. Artingstall's opinion that the inner portion would be blown ahead of that at the circumference of the pipe, which would be retarded by friction, seems sensible. On the other hand, it is difficult to believe that particles of the mixture, including stones of an inch and half in diameter, are floated independently in the air, as sand or grain is blown. Ray's testimony regarding the stones effectively disposes of that possibility under any such pressures as are used. It would seem to us that the

mass as a whole must block the passage of air, forming an obstruction which yields at different points, because of its uneven power of resistance, and that the heavier stones must be carried by the impact and momentum and cohesion of the lighter substances, the whole mass going forward in a constantly agitated mixed stream, just as McMichael describes. But whether the concrete goes forward as we imagine, or in some other manner, there is no sufficient reason to suppose that defendants' machine does not operate in the same manner as plaintiff's, whatever that manner may be. The District Court on conflicting evidence found infringement of the method claims (4 and 6), as well as of the apparatus claims. We are not convinced that this finding was wrong.

Apparently the "slug" theory was brought into the argument because it was thought necessary to distinguish in this way from Farnham, Warren, and Goldie. We have already suggested that those machines would require modifications to operate with concrete containing stones an inch and a half in diameter. Whether this was the ground adopted to distinguish them in the Ulen Case, or whether the court as then constituted accepted the slug theory, does not appear, and is not important. On some ground we distinguished the prior art, and sustained the validity of the patent, and that ruling we should follow, until its error is pointed out by higher authority.

It is urged that the defendants' structure and operation are different, in that (1) they do not use "dry," air-impervious concrete; (2) they do not put compressed air pressure behind the concrete mass; (3) they do not use a second compressed air stream at the bottom of the chamber, to break the dry concrete into slugs; and (4) they do not push the concrete through the delivery pipe in "slugs" by air pressure from behind.

We have already alluded to a portion of the specifications which indicates that the patent is not limited to "dry" concrete. It is true that the defendants' machine in its present form, whether or not this was so when the suit was started, is operated without an air inlet into the discharge chamber above the mass of concrete. But it is admitted by defendants' witnesses that, as soon as air is injected into the dis-

charge pipe, it is forced through the concrete and establishes a pressure in the chamber above. Mr. Ray, plaintiff's expert, testified that, because of this, the operation without the top air inlet is identically the same for all practical purposes as with the top inlet. While the claims which specify an upper air inlet (e. g., claims 2, 17, 34, and 35) might not be infringed by a machine which omits it, the other claims in suit make no reference to the upper air inlet. We think there is clearly infringement of claims 4, 6, 21, 22, and 28. The final decree appealed from awards money damages, and is sustainable on the infringement of these claims, even though other claims in suit were not infringed by the machine used by defendants at the time of the trial.

The decree is accordingly affirmed.

Manton, Circuit Judge, dissents.

UNITED STATES CIRCUIT COURT OF APPEALS, SECOND CIRCUIT

At a stated term of the United States Circuit Court of Appeals in and for the Second Circuit, held at the court-rooms, in the Post Office building, in the city of New York, on the 24th day of July, one thousand nine hundred and twenty-eight.

Present: Hon. Martin T. Manton, Hon. Learned Hand, Hon. Thomas W. Swan, Circuit Judges.

CONCRETE MIXING AND CONVEYING COMPANY,
Plaintiff-Appellee,

v.

POWERS KENNEDY CONTRACTING CORPORATION and Another,
Defendants-Appellants

Appeal from the District Court of the United States for the Southern District of New York

This cause came on to be heard on the transcript of record from the District Court of the United States for the Southern District of New York and was argued by counsel.

On consideration whereof it is now hereby ordered, adjudged, and decreed that the decree of said District Court be, and it hereby is, affirmed with costs.

It is further ordered that a Mandate issue to the said District Court in accordance with this decree.

L. H., T. W. S.

[Endorsed:] United States Circuit Court of Appeals, Second Circuit. Concrete Company v. Powers Kennedy Co. Order for mandate. United States Circuit Court of Appeals, Second Circuit. Filed Jul. 24, 1928. William Parkin, Clerk.

UNITED STATES CIRCUIT COURT OF APPEALS, SOUTHERN DISTRICT OF NEW YORK

I, William Parkin, Clerk of the United States Circuit Court of Appeals for the Second Circuit, do hereby certify that the foregoing pages, numbered from 1 to 449, inclusive, contain a true and complete transcript of the record and proceedings had in said Court in the case of Concrete Mixing and Conveying Company, Plaintiff-Appellee, against Powers Kennedy Contracting Corporation and another, Defendants-Appellants, as the same remain of record and on file in my office.

In testimony whereof I have caused the seal of the said court to be hereunto affixed, at the City of New York, in the Southern District of New York, in the Second Circuit, this 8th day of October, in the year of our Lord one thousand nine hundred and twenty eight, and of the Independence of the said United States the one hundred and fifty-third.

Wm. Parkin, Clerk. [Seal United States Circuit Court of Appeals, Second Circuit.]

[fol. 451] SUPREME COURT OF THE UNITED STATES

ORDER ALLOWING CERTIORARI—Filed December 10, 1928

The petition herein for a writ of certiorari to the United States Circuit Court of Appeals for the Second Circuit is granted. And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ, the case to be heard with No. 528 as one case.

Endorsed on cover: File No. 33,810. U. S. Circuit Court of Appeals, Second Circuit. Term No. 501. Powers-Kennedy Contracting Corporation and Anthony G. Fleck, petitioners, vs. Concrete Mixing and Conveying Company. Petition for writ of certiorari and exhibit thereto. Filed October 15th, 1928. File No. 33,810.

FILE COPY

APR 11 1930

IN THE

SUPREME COURT OF THE UNITED STATES

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK,
Defendants-Petitioners,
vs.
CONCRETE MIXING & CONVEYING COMPANY.
Plaintiff-Respondent.

No. ~~501~~ 3

CONCRETE MIXING & CONVEYING COMPANY (a Corporation),
Plaintiff-Petitioner,
vs.
R. C. STORRIE & COMPANY (a Partnership),
Defendants-Respondents.

No. ~~528~~ 4

OCTOBER TERM,

MOTION TO ADVANCE FOR RE-ARGUMENT.

LYNN A. WILLIAMS,
STEPHEN J. COX,
Solicitors for Concrete Mixing & Conveying Company.

Eastman Bros., Inc., Law Printers, 542 S. Dearborn St., Chicago.

IN THE

SUPREME COURT OF THE UNITED STATES

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, Defendants-Petitioners, vs. **CONCRETE MIXING & CONVEYING COMPANY,** Plaintiff-Respondent.	**No. 501.**
CONCRETE MIXING & CONVEYING COMPANY (a Corporation), Plaintiff-Petitioner, vs. **R. C. STORRIE & COMPANY (a Partnership),** Defendants-Respondents.	**No. 528.**

MOTION TO ADVANCE FOR RE-ARGUMENT.

To the Honorable, the Chief Justice and the Associate Justices of the Supreme Court of the United States:

And now comes Concrete Mixing & Conveying Company, by its solicitors, and moves that the above entitled cases (which your Honors recently ordered restored to the docket for re-argument) be advanced for re-argument at the session of this court beginning April 14, 1930.

These cases were argued together in this court on April 16 and 17, 1929.

Both cases involve the validity of letters patent to McMichael No. 1,127,660. The patent covers a means (method and apparatus) which is used, practically to the exclusion of all other means, for placing concrete linings in tunnels and subways. **The patent will expire in approximately twenty-two months, i. e., on February 9, 1932.**

The income of Concrete Mixing & Conveying Company is derived entirely from royalties or rentals paid by parties who practice the method of the patent and utilize the machines of the patent as furnished by Concrete Mixing & Conveying Company and its principal licensee, Ransome Concrete Machinery Company. Moreover, a very large and important part of the business of Ransome Concrete Machinery Company consists in the manufacture, distribution and leasing of the patented machines.

The utility and merit of the method and machine of the McMichael patent are now generally recognized and the same are in widespread use at the beginning of the last two years of the life of the patent. It is, therefore, imperative, from the standpoint of Concrete Mixing & Conveying Company and its licensee, Ransome Concrete Machinery Company, that your Honors pass upon the validity of the patent before very many of the remaining twenty-two months of its term have elapsed.

It has been and is necessary for Concrete Mixing & Conveying Company, in protecting itself against infringement of the McMichael patent, to proceed against *users* of the patented method and machine rather than against manufacturers of infringing machines. This is so because it is the users of such machines who derive greatest benefit and advantage from infringement, and

because the manufacturers of such machines are difficult to locate and almost invariably are financially irresponsible. The manufacturers of the machines in these cases alleged to infringe (and other parties as well) heretofore have sold or leased similar machines which have been used, in the practice of the patented method, by numerous contractors and construction companies throughout the United States. The statute of limitations is running against the causes of action for infringement which have thus arisen. In a great many of these situations (all of which will be controlled by your Honors' decision in the present cases) the statute of limitations will have run completely within the next six months.

Among the many instances of unlicensed use of the McMichael method and apparatus against which the statute of limitations will become effective within the next six months (as to all or a large part of the work performed) are the following:

The lining with concrete, by or for Southern California Edison Company of Los Angeles, California, of one 14 mile tunnel; one 10 mile tunnel; one 8 mile tunnel and two 3 mile tunnels—all located in the State of California.

The lining with concrete, by or for East Bay Water Company of Oakland, California (Bates & Borland of Oakland, California, contractors) of a tunnel (7150 feet) at Redwood Canyon, California.

The lining with concrete, by or for the City of Providence, Rhode Island, of the "Scituate" tunnel (Keystone State Construction Company of Philadelphia, Pennsylvania, contractor) of a water supply tunnel in which approximately 20,400 cubic yards of concrete were placed.

The lining with concrete, by or for Pacific Gas &

Electric Company of San Francisco, California, of a tunnel at Pitt River, California, the tunnel being approximately 2100 ft. long and 19 ft. in diameter.

The lining with concrete, by or for the City of Los Angeles, California, of an outfall sewer, in which approximately 18,000 cubic yards of concrete were placed.

The lining with concrete, by or for California-Oregon Power Co., of a tunnel approximately one mile in length, located at Copco, California.

The lining with concrete, by or for Portland Electric Power Company of Portland, Oregon (Hurley-Mason Co. of Portland, Oregon, contractor), of a tunnel approximately 3000 feet in length, located about 55 miles southeast of the City of Portland, Oregon.

The lining with concrete, by or for the City of Merced, California (F. Ralaudi of San Francisco, California, contractor), of four tunnels forming part of the Merced Irrigation District.

Unless these cases now pending in the Supreme Court are decided by your Honors within the next few months, Concrete Mixing & Conveying Company and its licensee, Ransome Concrete Machinery Company, will suffer irreparable loss and injury (even though your Honors ultimately agree with the Second Circuit Court of Appeals that the McMichael patent is valid) for the following reasons:

1. Unlicensed use of the patented invention (which has been on the increase while these cases have been pending in the Supreme Court) will continue to increase.

2. Concrete Mixing & Conveying Company and its licensee, Ransome Concrete Machinery Company, will be deprived of a very large part if not all of the profits and advantages which otherwise would flow to them dur-

ing the next twenty-two months by reason of their rights under the McMichael patent.

3. It will be necessary for Concrete Mixing & Conveying Company within the next few months to institute and maintain numerous suits in many different parts of the United States on causes of action against which the statute of limitations has nearly run,—suits which will be entirely controlled by your Honors' decision in the present cases.

Respectfully submitted,

LYNN A. WILLIAMS,
STEPHEN J. COX,
Solicitors for Concrete Mixing & Conveying Company.

State of Illinois, County of Cook, ss:

LYNN A. WILLIAMS, being duly sworn, deposes and says that he is of counsel for Concrete Mixing & Conveying Company, respondent in Case No. 501 and petitioner in Case No. 528, and that the facts stated in the foregoing motion are true to the best of his knowledge and belief.

LYNN A. WILLIAMS.

Subscribed and sworn to before me this 1st day of April, 1930.

GERTRUDE REINKE,
Notary Public.

[SEAL.]

FILE COPY

FILED
OCT 15 19
CHARLES ELMORE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1928

No. 101 to 3

POWERS-KENNEDY CONTRACTING CORP. and ANTHONY G. FLECK

Petitioners

v.

CONCRETE MIXING AND CONVEYING CO.

Respondent

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT

and

BRIEF FOR PETITIONERS

and

APPENDIX CONTAINING CONFLICTING OPINIONS OF THE LOWER COURTS

JOHN D. MORGAN
ALAN M. JOHNSON
Counsel for Petitioners

APPEAL PRINTING CO., 32 THAMES ST., NEW YORK CITY

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Supreme Court of the United States

OCTOBER TERM, 1928.

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, *Petitioners,* *v.* CONCRETE MIXING AND CONVEYING COMPANY, *Respondent.*	No.

PETITION FOR WRIT OF CERTIORARI.

May it Please the Court:

The petition of the Powers-Kennedy Contracting Corporation and Anthony G. Fleck respectfully shows to this Honorable Court:

Summary Statement of the Matter Involved.

The basis for this petition is that the Circuit Court of Appeals for the Second Circuit has held, in an opinion (27 Fed. [2nd] 668, and Appendix to our Brief, pp. 24-31) filed July 17, 1928, that United States Patent No. 1,127,660, to McMichael (R., pp. 372-379) is valid, and the Circuit Court of Appeals for the Ninth Circuit has held, in an opinion filed August 20, 1928, that said Patent No. 1,127,660 is invalid (not yet reported—Appendix to our Brief, pp. 43-53).

The Circuit Court of Appeals for the Second Circuit upheld the patent by a divided court, Judge MANTON, the presiding Judge, dissenting. The Circuit Court of Appeals of the Ninth Circuit invalidated the patent by a unanimous opinion (*Concrete Mixing and Conveying Co.* v. *R. C. Storrie & Co.*—See Appendix to our Brief, pp. 43-53). Thus, in these two litigations, two Circuit Judges have held Patent No. 1,127,660 to be valid, and four Circuit Judges have held the patent to be invalid.

The records in the two suits *in so far as they bear on the question of validity or invalidity of the patent* are substantially identical. On the questions of infringement (if the patent be valid) the two records are "widely different," as stated in the opinion of the Court of Appeals for the Ninth Circuit.

The question of the validity or invalidity of this McMichael Patent No. 1,127,660, is one of great and far-reaching industrial importance. Under the decision of the Court of Appeals for the Second Circuit, it is a valid, and in effect, a *pioneer* patent (Appendix to our Brief, p. 26, lines 12-22) and as such would completely control the pneumatic placing of concrete for the life of the patent, while under the decision of the Court of Appeals for the Ninth Circuit, the pneumatic placing of concrete is free to all. This industry not only is of vast proportions but extends to all parts of the country, and affects many thousands of building projects of all kinds. This uncertainty and the consequent injury to industry can only be terminated by this Court.

The patent to Smith, 122,497 (R., 389-394) was in the records of both suits. As to this patent, the Circuit Court of Appeals, Second Circuit, held:

> "* * * whether it was practically operable may well be doubted. * * * It cannot be regarded

> as an anticipation." (See Opinion, Appendix to our Brief, p. 27, lines 24-33).

As to this Smith patent, the Circuit Court of Appeals of the Ninth Circuit held:

> "The specifications described the apparatus as specially adapted to the manufacture and convection of *concrete* composition through pipes so as to set quickly upon reaching its destination, and form a solid mass of artificial stone, and uncontradicted testimony was given of the successful use of the Smith machine in conveying *concrete* through a pipe by compressed air." (Italics ours.)

The Circuit Court of Appeals of the Ninth Circuit, correctly applied the controlling authority of this Court in the case, namely, *Concrete Appliances Co.* v. *Gomery*, 269 U. S. 177, as to the anticipating relation of the other prior patents showing similar mechanism to that of McMichael's patent for pneumatically conveying materials other than concrete, holding:

> "It is true that Duckham was engaged in moving a material quite different from concrete, but that fact is not of importance on a question of anticipation (*Concrete Appliances Co.* v. *Gomery*, 269 U. S. 177)." (Appendix to our Brief, p. 46, lines 16-19.)

The Circuit Court of Appeals, Second Circuit, on the contrary, held this authority to be restricted to the precise facts of that case and as having no bearing on the present absolutely analogous case, nor any general bearing whatsoever, holding:

> "But the Gomery decision does not rest merely on the assumption that apparatus for coal and grain could have been used for wet concrete with-

> out inventive thought. * * * The idea was already of common knowledge and was being applied generally."

In view of these contradictory holdings, the *Gomery* decision means one thing in the Ninth Circuit, and exactly the opposite in the Second Circuit, and its authority and meaning in the remaining circuits is undetermined.

The Circuit Court of Appeals of the Second Circuit sustained the validity of the patent by a divided court, as previously noted, and, it would appear to your petitioners, it inferentially desires this Court to pass upon the validity of this patent:

> "Whether this was the ground adopted to distinguish them in the Ulen case, or whether the Court as then constituted accepted the slug theory, does not appear and is not important. On some ground we distinguished the prior art and sustained the validity of the patent, and that ruling we *should follow until its error is pointed out by higher authority.*" (Italics your petitioners.') (Appendix, p. 30, line 31, to p. 31, line 3.)

Reasons Relied on for the Allowance of the Writ.

1. The Circuit Court of Appeals of the Second and Ninth Circuits have rendered conflicting decisions as to the validity of McMichael patent No. 1,127,660.

2. Absolutely opposite constructions were given by those two tribunals to the controlling decision of this Court in *Concrete Appliance Co.* v. *Gomery*, 269 U. S. p. 177, in which your Honors held:

> "The observations of common experience in the mechanical arts would lead one to expect that, once the feasibility of using 'wet' concrete in building

operations was established, the mechanical skill of those familiar with engineering and building problems would seek to make use of known methods and appliances for the convenient handling of this new building material.

"To say nothing of the universally known methods and appliances for raising and distributing water, there were ready at hand widely used and generally understood appliances for the elevation and distribution of mobile substances, such as grain and coal, which involved, both in principle and in practical detail, all the elements described in the Callahan claims. Failure to make use of these obviously applicable methods and appliances in combination, suitable to the particular work in hand, in dealing with a new, plastic material capable of similar treatment, would, we think, have evidenced a want of ordinary mechanical skill and of familiarity with construction problems and methods."

3. Consequently, the Circuit Court of Appeals of the Ninth Circuit gave full effect to the decision in applying the prior art, stating:

> "It is true that Duckham was engaged in moving material quite different from concrete, but that fact is not of importance on the question of anticipation (Concrete Appliance Co. *v.* Gomery, 269 U. S. 177)."

But, the Circuit Court of Appeals of the Second Circuit refused to follow this authority, holding:

> "The Supreme Court case [Concrete Appliance Co. *v.* Gomery, 269 U. S. 177] does not require us to reconsider the validity of the McMichael patent" (Appendix, p. 26, lines 28-30).

4. Because of this refusal of the Circuit Court of Ap-

peals of the Second Circuit all of the anticipating and invalidating prior art was disregarded and set aside (Appendix, pp. 25-26).

5. In the face of Smith patent 122,497, which discloses a tank, a supply pipe for compressed air and a concrete conveying pipe, the Second Circuit Court of Appeals held the McMichael patent to be, in effect, a pioneer patent, as follows:

> "To do this was to make a new machine, and one who thought of doing it would have had a new and inventive idea; that is, that of blowing concrete, *which had not been done before*." (Italics ours.)

6. Four out of six Circuit Judges who considered these two cases held the patent to be invalid.

7. The fact, as a secondary defense, that McMichael was not a prior inventor, and, therefore, for that reason the patent is invalid.

8. The fact, as a secondary defense, that McMichael introduced new matter into his application while pending before the Patent Office, and on this ground the patent is invalid.

9. The fact, as a secondary defense, that McMichael's machine will not operate as described in the specification of the patent, and on this ground the patent is invalid.

10. The fact, as a secondary defense, that the Court of Appeals of the Second Circuit did not give proper weight to a copyrighted article published in the Journal of the Western Society of Engineers on May 13, 1918, by Mr. Kirkland, the respondent's chief engineer, several years before any suit was brought on the McMichael pat-

ent, in which he described the operation of the McMichael machine (R., pp. 147, 148) *which is exactly the same as the operation of the sand, grain, coal and ash pneumatic blowers, of record,* and wherein Kirkland also stated that he "blew" or transported both concrete and limestone screenings with the McMichael machine as the job demanded. Also in not giving proper weight to testimony of prior use, based on this documentary evidence, supported by oral testimony; all of which, if properly weighed, would show that the McMichael patent is invalid on this secondary ground.

WHEREFORE, your petitioners respectfully pray that a writ of certiorari be issued out of and under the seal of this Honorable Court, directed to the Circuit Court of Appeals of the Second Circuit, commanding that Court to certify and to send to this Court for its review and determination, on a day certain to be therein named, a full and complete transcript of the record and all proceedings in the case entitled on its docket—No. 9732, Concrete Mixing and Conveying Company, Plaintiff-Appellee *v.* Powers-Kennedy Contracting Corporation and Anthony G. Fleck, Defendants-Appellants, and that the decree of the said Circuit Court of Appeals for the Second Circuit may be reversed by this Honorable Court, and that your petitioners may have such other and further relief in the premises as to this Honorable Court may seem meet and just; and your petitioners will ever pray.

POWERS-KENNEDY CONTRACTING CORPORATION
and ANTHONY G. FLECK,

By JOHN D. MORGAN,
ALAN M. JOHNSON,
Counsel.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1928.

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, *Petitioners*, v. CONCRETE MIXING AND CONVEYING COMPANY, *Respondent.*	No.

BRIEF IN SUPPORT OF PETITION FOR WRIT OF CERTIORARI.

I.

Opinions of the Courts Below.

The opinion of the Circuit Court of Appeals of the Second Circuit in this case was handed down July 17, 1928 (27 Fed. [2nd] 668; R., 414, and Appendix hereto, p. 21). The opinion of the district judge was not reported, but is printed in R., 417, and Appendix hereto (p. 22).

The conflicting opinion of the Court of Appeals of the Ninth Circuit in *Concrete Mixing & Conveying Co.* v. *R. C. Storrie & Co.* was handed down August 20, 1928, and has not been reported (See Appendix hereto, p. 43). The opinion of the District Judge in that case is reported in 23 Fed. (2nd) 131 (Appendix hereto, p. 32).

The "*Ulen* suit" (*Concrete Mixing & Conveying Co.* v. *Ulen Contracting Corp.*) is referred to freely in the record and decisions, and the decision of the District Judge therein is found in 12 Fed. (2nd) 929 (Appendix, p. 15).

The opinion of the Court of Appeals of the Second Circuit is found in 12 Fed. (2nd) 931 (Appendix, p. 21).

Your petitioners were in nowise connected with the *Ulen* suit.

To more readily clarify the position of the Court of Appeals for the Second Circuit, a brief detailed consideration of the decisions will be had.

In the trial of said *Ulen* suit in the District Court, Judge A. N. HAND brushed aside the prior art having substantially the same structure and mode of operation as the McMichael patent for the reason that the materials handled or "blown" were not the same. On this point, he held:

> "A device for transporting sand, ashes, or coal, even, by means of an apparatus having a structural resemblance to complainant's device nearer than we find, furnishes no anticipation of the patent, and McMichael's conveyor, when applied to concrete, is not objectionable as a double use. Concrete Appliances Co. *v.* Meinken (C. C. A.), 262 F. at page 964. As Judge Denison remarked in the foregoing case: 'Certainly the art of loading coal into a ship for fuel is not the same art as that of distributing wet concrete to a building structure; nor is the analogy very close.'"

This decision of the Circuit Court of Appeals of the Sixth Circuit (*Concrete Appliances* v. *Meinken*, 262 Fed. 964) upon which Judge HAND relied, was one of the conflicting decisions which brought the Callahan patent before your Honors on certiorari in *Concrete Appliance Co.* v. *Gomery*, 269 U. S., p. 177, and this particular ruling as to the invalidating effect of the prior art was emphatically reversed in the passage from *Concrete Appliances*

Co. v. *Gomery*, quoted at pages 4 and 5 of our accompanying petition.

The *Gomery* decision was handed down by your Honors on November 16, 1925.

Notwithstanding that the District Judge in the *Ulen* suit had followed the Court of Appeals of the Sixth Circuit in disregarding the prior patents, for blowing grout (which is wet concrete with only small stones or none), sand, wheat, ashes, etc., and further notwithstanding the explicit reversal of the decision of the Court of Appeals of the Sixth Circuit by your Honors in the *Gomery* decision, the Court of Appeals, Second Circuit, on May 3, 1926 (12 Fed. [2nd] 931), affirmed the District Court *per curiam*, without opinion.

In the present case, the Court of Appeals of the Second Circuit *again* refused to follow your Honors' decision in the *Gomery* case, and, in fact, persisted in following the reversed decision of the Court of Appeals of the Sixth Circuit, and their own decision in the *Ulen* suit based thereon, stating:

> "* * * that ruling we should follow, *until its error is pointed out by higher authority.*" (Italics ours.)

II.

Jurisdiction.

The date of the opinion of the Circuit Court of Appeals of the Second Circuit is July 17, 1928—27 Fed. (2nd) 668. The mandate has been stayed until October 15, 1928, pending the filing of this petition. The petitioners are under bond for some $21,000.

III.

Statement of the Case.

A full statement of the case has been given in the accompanying petition, and, in the interest of brevity, the statement will not be repeated at this point.

IV.

Specification of Errors.

A full statement of the errors has also been made in the petition, and, for the sake of brevity, will not be here repeated.

V.

Argument.

The facts and reasons which have been set forth in the accompanying petition, and preceding portions of this brief, are believed to be sufficient to set this cause before your Honors, and that fuller argument at this point may be waived for the sake of brevity, except that Farnham patent 747,396 (R., 44) for "blowing" sand, having essentially the same structure as McMichael, exemplifies a part of the prior art which was disregarded by the Second Circuit Court of Appeals. It is reproduced, pages 55 *et seq.* Appendix hereto.

CONCLUSION.

It is, therefore, respectfully submitted that this case is one calling for the exercise by this Court of its supervisory powers, in order that the confusion and uncertainty in the trade due to the conflicting decisions of the

Circuit Court of Appeals of the Second and Ninth Circuits, on the validity of the McMichael patent, be terminated, and that to such an end a writ of certiorari should be granted and this Court should review the decision of the Circuit Court of Appeals for the Second Circuit and finally reverse it.

Respectfully submitted,

JOHN D. MORGAN,
ALAN M. JOHNSON,
Counsel for Petitioners.

APPENDIX.

CONFLICTING OPINIONS OF THE COURTS of the SECOND AND NINTH CIRCUITS on the VALIDITY OF McMICHAEL PATENT NO. 1,127,660

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

CONCRETE MIXING & CONVEYING COMPANY, *Complainants,* v. ULEN CONTRACTING CORPORATION and SHANDAKEN TUNNEL CORPORATION, *Defendants.*	E 26/325

STEPHEN J. COX, Solicitor for Complainant, STEPHEN J. COX and A. G. MCCALEB, Counsel.

JAMES L. STEUART, Solicitor and Counsel for Defendant Ulen Contracting Corporation.

FRANK S. MOORE, Solicitor for Defendant Shandaken Tunnel Corporation, JAMES L. STEUART, Counsel.

AUGUSTUS N. HAND, District Judge:

This is a suit for infringement of U. S. Letters Patent No. 1,127,660 to John H. McMichael, granted February 9th, 1915, Claims 2, 4, 6, 17, 21, 22, 28, 34 and 35.

The invention has for its object to provide a method of and an apparatus for elevating and transporting concrete. The patentee describes concrete in the specification as "a composition containing relatively large pieces of rock or stone as uniform in size as possible, together with predetermined proportions of sand, cement and water." Pneumatic pressure is used to compress the concrete into a restricted conduit pipe and then additional

pressure by means of a jet of compressed air is applied to the mass near the entrance of the conduit pipe, thereby pushing the mass into and along the conduit. The McMichael invention is a most interesting one and has apparently met with general acceptance. Engineers at first distrusted the possibility of lifting and conveying concrete long distances by the McMichael device. The very material would be likely to clog any long pipe line. Moreover the weight would be so great if conveyed as a mass by means of pressure from the rear, that too great pressure for safety would be required, if, indeed, enough could be applied where the distance was long and concrete, as in some cases, was lifted eighty feet. Various attempts to convey sand appear in a number of patents, and in the Goldie Patent No. 707,840, sand was ejected under railroad ties by steam pressure.

In the Farnham Patent No. 747,396, there was a sandblast apparatus shown where the sand was carried into the discharge pipe by gravity aided by compressed air and then ejected by an air blast nozzle entering the discharge pipe in the general direction thereof. The patent to Sticker No. 758,118 is likewise for a sandblast.

None of these patents, in my opinion, would teach anyone with imagination and talents short of a real inventive faculty to install a conveyor which would obviate the delay and expense of laying concrete by hand about the forms on which a tunnel is built. They were kinetic devices for floating light material. This was in substance so even in the case of the Goldie patent where dry cement, or cement mixed with sand or gravel, was ejected from a short hose by an air or steam waterblast. It is not accomplished by a heavy air pressure as in the patent in suit, but by air or steam velocity.

In the McMichael patent the second blast of compressed air at once cuts the concrete mass and shoves along the segment of concrete. The segment to be shoved along is of comparatively small weight and dimension so that it can be carried without clogging the discharge pipe. Mr. Kirkland, the chief engineer of the complainant, described this at page 9 of the record:

> "Q12. What is the effect as you have observed the operation of the machine of working the jet at the bottom directed at a line or an angle to the travel of the material in passing from the main vessel? A. The air breaks up or penetrates the mass as it goes toward the outlet, detaching portions of it, so that these portions will present a surface to the oncoming booster jet so that they may be forced through the pipe.
>
> "Q13. And are these batches solid or in detached portions? A. They come on in waves. Sometimes the successive portions of each batch follow each other so rapidly through the pipe that to the casual observer it would be almost impossible to tell whether it was a continuous stream or successive batches, but in long pipe lines, the successive batches are more pronounced and one observing them will note a wave,—that the material comes in waves.
>
> "Q14. How far has concrete been conveyed and placed in this apparatus from the apparatus itself? A. On the Twin Peaks tunnel in San Francisco we placed it at a distance of 4,900 feet from the machine."

Mr. Bateman, the superintendent of the well known contractors Booth & Flinn, confirmed the foregoing testimony as to the discharge of the concrete from the complainant's machine in sections.

Complainant's expert, Frederick Ray, said:

> "The net result of that is that it is possible to handle this concrete in slugs through a long pipe with a comparatively low pressure of air, that is a pressure of air around 100 pounds whereas to force it as a continuous stream through such a pipe, might take thousands of pounds or it might even be impossible, but certainly concrete can be forced through a certain length of pipe" (Minutes, p. 91).

Mr. Ray points out the portion of the specification which indicates that the inventor understood these advantages of his invention. McMichael says at page 2, lines 45 to 100 of the specification:

> "It will be observed that the upper air pipe 8 serves merely to supply air to the upper part of the chamber 1, the pressure of the air being uniformly applied over the entire upper surface of the mass. The lower pipe 10, however, serves to direct a jet of air moving at a considerable velocity directly against portions of the mass as they move toward and into the discharge duct. The two pipes thus act in very different ways, the upper pipe supplying air which acts by pressure and the lower pipe supplying air which acts by velocity. On account of the presence of large and small particles, and on account of the presence of water, a mass of concrete forming materials (whether completely mixed or not) is relatively compact and impervious to air, and on this account the upper air body acts by applying a uniform pressure to the entire upper mass surface and without any substantial penetration of the air itself to the interior of the mass. Air from the lower pipe 10 may force itself into the body of the mass, and the relatively small air jet acting upon the relatively large stream of

> outward moving materials directly engages with the submasses to push them along. This action of the two air bodies in my apparatus is to be contracted with the action of air in earlier devices which were so constructed that light materials such as grain or ashes could be caught in large moving air bodies and carried along in suspension with each particle separated from the others. One of the strongly marked and novel matters incident to this provision of the pipe 10 for introducing air directly into the discharge pipe, whether considered by itself or considered as supplemental to the agency such as the air from pipe 8 tending to effect downward and forward propulsion of the entire mass, is this, that the rapidly moving air from pipe 8 to pipe 10 acts upon sub-masses, successively of the general mass, at points near those where they enter the delivery pipe, the result being that the thorough commingling of the ingredients (rock pieces, sand, cement and water) well understood by the engineer to be essential to a perfect concrete, can be attained with great rapidity and with a perfect, uniform, distribution of the various ingredients as concerns the relative positions of all the component particles."

A device for transporting sand, ashes or coal even by means of an apparatus having a structural resemblance to complainant's device nearer than we find furnishes no anticipation of the patent and McMichael's conveyor when applied to concrete is not objectionable as a double use. Concrete Appliance Co. *v.* Meinken, 262 Fed. at p. 964. As Judge DENISON remarked in the foregoing case:

> "Certainly the art of loading coal into a ship for fuel is not the same art as that of distributing wet concrete to a building structure; nor is the analogy very close." See also Hobbs *v.* Beech, 180 U. S. at p. 389.

The appreciation by the inventor of the necessity of limiting the concrete to be conveyed to sections of moderate size and weight and his method by the second air jet of securing the cutting off of a segment from the mass of concrete and a propulsion of this segment through the discharge pipe involves invention of a high order. His device has displaced all other methods for rapidly and economically conveying, lifting and placing concrete at long distances from the initial source of supply and has been used in numerous great enterprises. In such circumstances his claims should be read broadly and given a fair range of equivalents. When so read I think the defendants plainly infringe.

The process claims are limited to no particular form of apparatus so that the contention that they are for a mere function seems without merit. Expanded Metal *v.* Bradford, 214 U. S. 366; Buffalo Forge Co. *v.* City of Buffalo, 255 Fed. 83.

I find claims 2, 4, 6, 17, 21, 22, 28, 34 and 35 valid and infringed, and grant an interlocutory decree to the complainant with the usual reference.

A. N. H.,
D. J.

Filed August 4, 1925.

CIRCUIT COURT OF APPEALS,

SECOND CIRCUIT.

CONCRETE MIXING & CONVEYING CO.,
Plaintiff-Appellee,

v.

ULEN CONTRACTING CORPORATION and SHANDAKEN TUNNEL CORPORATION,
Defendants-Appellants.

No. 332.

May 3, 1926.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE SOUTHERN DISTRICT OF NEW YORK.

JAMES L. STEUART, of New York City, for Appellants.

STEPHEN J. COX, of New York City, and WILLIAMS, BRADBURY, MCCALEB & HINKLE, of Chicago, Ill., for Appellee.

Before ROGERS, HOUGH and MACK, Circuit Judges.

Per Curiam. Decree (12 F. [2d] 929) affirmed.

#1177

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

CONCRETE MIXING AND CONVEYING CO., *Complainant,*

against

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, *Defendants.*

E 30/294

STEPHEN J. COX, Solicitor and Counsel for Complainant.

JOHN D. MORGAN, Solicitor for Defendants; JOHN D. MORGAN and ALAN M. JOHNSON, Counsel.

AUGUSTUS N. HAND, District Judge:

This is an attempt to retry the issues determined in the case of Concrete Mixing & Conveying Co. *v.* Ulen Contracting Corporation, 12 Fed. (2d) 929; 931. The main reliance is upon a prior use which is alleged to have occurred over twenty years ago. No contemporary sketches are produced and the two witnesses attempt to describe from memory a mechanism which was not used except on two occasions. If such a practical device as that of the patent in suit had been employed, it is hardly likely that a contractor used to conducting large enterprises would not have sought a patent, or at least have taken advantage of something which in recent years has met with signal success. I am not satisfied that the defendants have established the prior use.

Aside from this new proof the defendants rely on the

old contention made in the earlier case that their device is purely kinetic. I do not regard it as theoretically probable that masses of concrete containing gravel stones of a diameter running to one and a half inches can be blown long distances by compressed air and I think the testimony of Mr. Ray that he could detect the passage of a series of slugs when he put his ear to the outlet pipe is the more probable testimony. Moreover, if air were floating the concrete it would be bound to pass through the pipe and the pressure would be so rapidly reduced that the heavier portions would be left in the pipe.

All of the claims were infringed until the Powers-Kennedy structure was impaired in the hope of avoiding infringement. After ceasing to introduce pressure behind the mass of concrete by means of closing the upper valve, it is true that some of the claims are not met, yet some of them are. There is undoubtedly a pressure behind the mass if defendants' machine far greater than ordinary air pressure and varying according to the freedom with which the air in the outlet tube is passing through it. As each slug was discharged, the pressure in the discharge pipe would lessen and the pressure behind the mass amounting to something like thirty pounds would force a further slug into the outlet. If this were not so, the high pressure through the discharge pipe would hold back the concrete.

As for the point raised that patents for kinetic devices are pertinent prior art, it is answered by the fact that neither the patent in suit nor the defendants' device is kinetic in operation.

The complainant is entitled to an interlocutory decree with the usual reference, the same to be settled on notice.

A. N. H.,
D. J.

November 8, 1926.

CIRCUIT COURT OF APPEALS,

SECOND CIRCUIT.

CONCRETE MIXING & CONVEYING CO. *v.* POWERS-KENNEDY CONTRACTING CORPORATION, *et al.*	No. 131.

July 17, 1928.

Appeal from the District Court of the United States for the Southern District of New York.

Suit by the Concrete Mixing & Conveying Company against the Powers-Kennedy Contracting Corporation and another for infringement of claims Nos. 2, 4, 6, 17, 21, 22, 28, 34, and 35 of McMichael patent, No. 1,127,660, granted February 9, 1915, for "methods of an apparatus for transporting and treating concrete." Defendant corporation was builder of the Queensboro Crosstown subway in Forty-second street, New York City, and used in this work a machine for conveying and placing concrete by compressed air, which is alleged to infringe the patent in suit. The individual defendant furnished the machine to the corporation. Decree for complainant, and defendants appeal. Affirmed.

Appeal from the District Court of the United States for the Southern District of New York.

JOHN D. MORGAN, of New York City (ALAN M. JOHNSON, of New York City, of counsel), for appellants.

STEPHEN J. COX, of New York City (WILLIAMS, BRADBURY, MCCALEB & HINKLE, of Chicago, Ill., of counsel), for appellee.

Before—MANTON, L. HAND, and SWAN, Circuit Judges.

SWAN, Circuit Judge. These same claims were held valid and infringed by the same District Judge in Concrete Mixing & Conveying Co. *v.* Ulen Contracting Corp., 12 F. (2d) 929. We affirmed that decree without opinion. 12 F. (2d) 931. A detailed description of the patent in suit need not be here repeated. Subsequently Judge BOURQUIN held the patent invalid in Concrete Mixing & Conveying Co. *v.* R. C. Storrie & Co. (D. C.) 23 F. (2d) 131. It is urged that, because of his decision and the case of Concrete Appliance Co. *v.* Gomery, 269 U. S. 177, 46 S. Ct. 42, 70 L. Ed. 222, as well as because of new matter introduced in this record, we should reconsider the validity of the patent.

The new matter is, of course, open to us and will be dealt with hereafter. The Supreme Court case, however, contains nothing, in our opinion, which casts doubt upon the correctness of the Ulen decision; in fact, it was before us when that decision was made. It holds, affirming the judgment of the Circuit Court of Appeals for the Third Circuit in 291 F. 486, that the Callahan patent, which covered an apparatus operating on the gravity principle for distributing "wet" concrete, was invalid, because it merely made use of known methods and appliances for the convenient handling of this recently accepted building material. The appellants' argument runs that, since the Supreme Court emphasizes that old apparatus used for distributing water, grain, or coal was readily adaptable for handling concrete, so the prior art patents for blowing

sand, grain, or grout, which in the Ulen case were held not to invalidate McMichael's patent, should now be deemed complete anticipations of it. But the Gomery decision does not rest merely on the assumption that apparatus for coal and grain could have been used for wet concrete without inventive thought. Adaptations of old carriers to handle concrete were shown to have been frequently made for several years before the application for the patent there in suit. The idea was already of common knowledge and was being applied generally. Therefore Callahan's adaptation was not an invention.

[1] But that is a very different situation from the one before us in the Ulen case, where nobody before McMichael had ever used a pneumatic apparatus to transport concrete. The Warren and Farnham sand-blast machines (patents No. 671,303 and No. 747,396) could not have been so used without increasing the size of the discharge pipes and cutting off the sand-blast nozzles. To do this was to make a new machine, and one who thought of doing it would have had a new and inventive idea; that is, that of blowing concrete, which had not been done before. When that is so, the physical change in the apparatus need be very little to sustain a patent. The only reason why a new one is not patentable is that the law grants patents only for new things, not for new ideas. Similarly Goldie's machine (patent No. 707,840) for blowing cement could not, so far as appears, have been used as it stood for concrete, and never was so used. The Supreme Court case does not require us to reconsider the validity of McMichael's patent.

[2] In the suit against Storrie & Co., Judge Bourquin seems to have relied to some extent, at least, upon pat-

ents which were not in the record in the Ulen case and are not now before us. But whatever the court as now constituted might think of the correctness of our former ruling, it is our duty to follow it, unless new evidence raises questions of the patent's validity not previously considered. See Cortelyou *v.* Charles E. Johnson & Co., 145 F. 933, 934 (C. C. A. 2); Crier *v.* Innes, 170 F. 324 (C. C. A. 2).

The new evidence of the patent art upon which appellants rely to distinguish the Ulen decision includes two patents granted in 1872 to W. H. Smith. No. 122,497 is for an improvement in concrete pavements and claims concrete "prepared for use in a liquid or semiliquid condition, capable of flowing in pipes and running into molds." No. 122,498 discloses a machine for mixing liquid concrete and conveying it by a discharge pipe from the mixer to the spot where it is to be laid. The concrete is to flow through the discharge pipe by gravity, or, as an alternative, after flowing by gravity through a small winding passage into a chamber, *F*, is to be forced into the discharge pipe by the pressure of steam or compressed air admitted into the chamber above the mass of the concrete. The chamber has a flat bottom of large area relative to the size of the discharge pipe, the outlet of which opens into the center of the bottom. While this machine discloses the idea of forcing concrete through a pipe by compressed air, whether it was practically operable may well be doubted. It would seem that a large quantity of the concrete, or at least the stones of which it is partly composed, would necessarily accumulate upon the flat bottom of the chamber. In any event, it was very different from McMichael's device, which injects air into the concrete at its entrance into the discharge outlet. It cannot be regarded as an anticipation.

Nor can the argument that the patent in suit is limited to "dry" concrete, as distinguished from defendants' "wet" concrete, prevail. It declares on page 3, line 55: "It is equally well adapted for the treating and handling of a mass containing a considerable excess of water, in case such an excess is for any reason found desirable." The other new references in the Patent Office (Canniff, McIlvrid Beach, and Davidson) we regard as less persuasive than those which were passed upon in the Ulen case.

[3, 4] The new defense of prior use was held by the District Court not sufficiently proved, and with this we agree. This use was of a machine which Artingstall and Fanning said that they saw laying a concrete floor in 1903, subsequently changing the date to 1904. That was 22 years before they gave their testimony, and there was no documentary corroboration of any kind. It is true that in 1918 Artingstall described very generally before a meeting of engineers that this process was practiced in 1903, but that cannot be deemed documentary corroboration. Fanning says the machine was also used in one section of a tunnel in Chicago in 1903, and was apparently abandoned as too expensive. It is one thing to say that a continuous use to date may be found on oral testimony to have started at a given time, and quite another to say that such testimony is enough when it describes only a casual use, abandoned thereafter, and never entering into the art until after the patent in suit was applied for, an interval of nearly 3 years. Such casual and abandoned uses do not contribute to the stock of knowledge which makes up the art. If we may invalidate a patent upon such prior uses, so proved, no patent would be safe. A prior use, such as constitutes an anticipation, was not proven with the degree of certainty which the courts re-

quire. See Deering *v.* Winona Harvester Works, 155 U. S. 286, 300, 15 S. Ct. 118, 39 L. Ed. 153; Internat. Cork Co. *v.* New Process Cork Co., 6 F. (2d) 420, 424 (C. C. A. 2); De Laski & Thropp Co. *v.* Fisk Rubber Co., 203 F. 986 (C. C. A. 1).

Much argument has been expended in an effort to establish just how the plaintiff's and defendants' machines operate in sending the concrete through the discharge pipe—the plaintiff contending that both discharge it in a succession of slugs or pistons, while the defendants claim that both, or at least theirs, operate kinetically and float the materials in the air, just as sand or grain is carried in floatation. To us the dispute seems irrelevant. The patent says nothing which commits the patentee to the slug method of operation. The theory is built upon the use of the phrase "submasses," as in lines 72 and 89, page 2, where it is said that the lower air jet "engages with the submasses to push them along." But this cannot mean solid "slugs," for on the same page, lines 92-99, the effect is said to be thoroughly to commingle all the ingredients and insure a better mix. Again, at line 113, page 3: "The delivery pipe itself becomes a mixing chamber, wherein pneumatic mixing is effected or continued." And see, also, line 86, page 3. Such statements necessarily forbid the notion of solid slugs. All that is meant by "submasses" is the portions that descend into the discharge pipe, *14*, and by their descent are separated from the general mass in the main chamber *1*. It is a synonym for "portions of the mass as they move toward and into the discharge duct." Line 53, page 2.

Moreover, several of the claims in suit are for the apparatus, or machine, and if they are infringed it is enough for the purposes of this suit, whether the machine dis-

charges its concrete kinetically or in successive slugs. Neither theory is entirely persuasive. Artingstall's opinion that the inner portion would be blown ahead of that at the circumference of the pipe, which would be retarded by friction, seems sensible. On the other hand, it is difficult to believe that particles of the mixture, including stones of an inch and half in diameter, are floated independently in the air, as sand or grain is blown. Ray's testimony regarding the stones effectively disposes of that possibility under any such pressures as are used. It would seem to us that the mass as a whole must block the passage of air, forming an obstruction which yields at different points, because of its uneven power of resistance, and that the heavier stones must be carried by the impact and momentum and cohesion of the lighter substances, the whole mass going forward in a constantly agitated mixed stream, just as McMichael describes. But whether the concrete goes forward as we imagine, or in some other manner, there is no sufficient reason to suppose that defendants' machine does not operate in the same manner as plaintiff's, whatever that manner may be. The District Court on conflicting evidence found infringement of the method claims (4 and 6), as well as of the apparatus claims. We are not convinced that this finding was wrong.

Apparently the "slug" theory was brought into the argument because it was thought necessary to distinguish in this way from Farnham, Warren, and Goldie. We have already suggested that those machines would require modifications to operate with concrete containing stones an inch and a half in diameter. Whether this was the ground adopted to distinguish them in the Ulen case, or whether the court as then constituted accepted the slug theory, does not appear, and is not important. On some

ground we distinguished the prior art, and sustained the validity of the patent, and that ruling we should follow, until its error is pointed out by higher authority.

It is urged that the defendants' structure and operation are different, in that (1) they do not use "dry," air-impervious concrete; (2) they do not put compressed air pressure behind the concrete mass; (3) they do not use a second compressed air stream at the bottom of the chamber, to break the dry concrete into slugs; and (4) they do not push the concrete through the delivery pipe in "slugs" by air pressure from behind.

We have already alluded to a portion of the specifications which indicates that the patent is not limited to "dry" concrete. It is true that the defendants' machine in its present form, whether or not this was so when the suit was started, is operated without an air inlet into the discharge chamber above the mass of concrete. But it is admitted by defendants' witnesses that, as soon as air is injected into the discharge pipe, it is forced through the concrete and establishes a pressure in the chamber above. Mr. Ray, plaintiff's expert, testified that, because of this, the operation without the top air inlet is identically the same for all practical purposes as with the top inlet. While the claims which specify an upper air inlet (e. g., claims 2, 17, 34, and 35) might not be infringed by a machine which omits it, the other claims in suit make no reference to the upper air inlet. We think there is clearly infringement of claims 4, 6, 21, 22, and 28. The final decree appealed from awards money damages, and is sustainable on the infringement of these claims, even though other claims in suit were not infringed by the machine used by defendants at the time of the trial.

The decree is accordingly affirmed.

MANTON, Circuit Judge dissents.

DISTRICT COURT, WESTERN DISTRICT, WASHINGTON,

NORTHERN DIVISION.

CONCRETE MIXING & CONVEYING CO. v. R. C. STORRIE & CO.	No. 394.

November 12, 1927.

In Equity. Suit by the Concrete Mixing & Conveying Company against R. C. Storrie & Co. Decree for defendant.

LYNN A. WILLIAMS, CLIFFORD C. BRADBURY and ALBERT G. MCCALEB, all of Chicago, Ill., and BATTLE, HULBERT & HELSELL, of Seattle, Wash., for Plaintiff.

CHARLES E. TOWNSEND, of San Francisco, Cal. (S. F. CHADWICK, of Seattle, Wash., and WILLIAM A. LOFTUS, of San Francisco, Cal., of counsel), for Defendant.

BOURQUIN, District Judge:

This infringement suit involves claims 1, 2, 17, 18, 24, 29, 34 and 35 of McMichael's patent 1,127,660, granted February 9, 1915, on application filed January 14, 1907. The usual defenses are interposed.

The answer alleges there are 10,000 patents in the art, cites 100, and there are an extraordinary number of references. For this, palliation is attempted by semi-

apologetic "inability to forecast how they may be judged by the court," which may be taken as a courteous expression of doubt of the court's comprehension, or of fond hope that it may be deluded. Of the claims in suit, 2, 17, 34, and 35 were held valid in Concrete, etc., Co. *v.* Corp. (D. C.) 12 F. (2d) 929, Id. (C. C. A.) 12 F. (2d) 931. The record of that case differs from this at bar.

In the beginning McMichael's application was limited to "improvements in apparatus for transporting granular and plastic building material, such as sand, plaster, mortar, and concrete." Then, as now, the apparatus consisted of an upright cylindrical container, with hopper bottom terminating in a discharge pipe to the hopper connected by a U-bend. Two separately controlled air pipes connected with the container; one at the top, the other near the bottom and pointing downward. The specification in description of function and operation stated that air "under any desired pressure," admitted through the upper pipe and over the material, by its pressure would force the latter downward and through the discharge pipe; that as the material passed through the U-bend it would be more or less tightly packed, which would tend to "hold the water and the *granular* material with which it is mixed intact, so that the tendency to blow the water out of the material is eliminated"; that "to loosen the material at the lower end of the hopper, should the same become packed, I provide the additional air pipe adapted to discharge air through the material."

Of six claims, one only related to the lower air and as follows: "An air pipe to deliver air at the lower end of the hopper, substantially as described." McMichael's prosecution of the application was dilatory to the limit of time, once incurring forfeiture. After more than two

years, interference was declared with Leake. The latter's application had been filed October 7, 1907, and was for "improvements in a cement mixing and distributing system * * * for preparing a concrete mixture and delivering it." Leake's apparatus contained all of McMichael's, and more, but without the U-bend. Its air pipes were of single control, and that for the lower air terminated in three nozzles opposed in one plane. In function and operation Leake's specification stated that the upper air would force the concrete down past the said nozzles, "where it can be detached in portions and blown" into and through the discharge pipe.

Several of his claims were variations of this following, viz.: "The method of conducting plastic material through a closed conduit, which consists in introducing the plastic material in a mass in a chamber connected to said conduit, introducing relatively compressed air behind the whole mass and behind a front portion thereof, and thereby detaching successive portions and driving them from the chamber into the conduit and along the latter."

For the purposes of interference, to McMichael the Commissioner suggested four claims, including the claim aforesaid verbatim from Leake, which McMichael promptly accepted as substitutes for his six, thereupon canceled by him. The interference was not concluded, for that plaintiff became assignee of both applications. Ultimately patents were granted for both, Leake's, 1,215,558, upon February 13, 1917; but, whereas McMichael's contains the aforesaid claim verbatim from Leake and several like, but of some difference, in phraseology, Leake's, curiously enough, changed the form theretofore his own, but retained the substance. In the meantime Bliss, of Washington, had become attorney for both applications,

and January 24, 1911, and later in behalf of McMichael, he filed very extensive amendments of specification and claims, increasing the latter to 35.

In the course of these proceedings in McMichael (to which the comment in Greenwalt's Case [D. C.] 3 F. [2d] 660, is applicable), the invention is expanded to include method, as well as apparatus, and by exclusion is restricted to only concrete. Although the amended specification included the function originally ascribed to the lower air as aforesaid, it also declared that McMichael had "found" that the lower air is "very effective in aiding the passage of the material into and through" the discharge pipe; that, "in cases where the friction" by the mass driven down by the upper air "is serious," the lower air "gives to the material the velocity which is needed to carry it to the remote point of delivery"; that it "acts upon the submasses successively, * * * the result being thorough commingling of the ingredients," for that "the delivery pipe itself becomes a mixing chamber," but therein "the components are not driven apart or carried to different distances because of differences in specific gravity."

The amendments so far ignore the U-bend, so prominent in the original application and claimed eo nomine, that its function in respect to granular material in the original claimed is eliminated, along with all reference to granular material itself, and in only two or more claims of the patent is it indicated by the statement that the discharge pipe is "provided with a bend," without any function or effect ascribed to it, save that "the material will be more or less tightly packed as it is directed therethrough." The latter standing alone, is not beneficial, and, because detrimental, the U-bend in practice is no longer used or incorporated in the apparatus.

The amended specification also stated that the upper air is the primary force, the pressure of which "compels the entire mass to escape into the pipe with great rapidity and force," thence assisted in discharge by the lower air. In practice, the air pressure is maintained at 100 pounds, and the container holds about two cubic yards or less of concrete. The claims in issue are for apparatus and method in their various elements.

The charge of infringement against defendants is predicated upon their use of Hackley's apparatus, patent 1,619,297 of 1927. This latter is an oblong container, ovoid in cross-section, without upper air pipes, but having four lower air pipes. The discharge pipe is at the bottom and one end, and the disposition of the lower air pipes is entrance at the bottom, pointing towards the discharge pipe, one opening into the entrance of the latter, one opening into the opposite end of the container, and between them open the other two and equalizing the distances between all of them in order. In operation the container filled, the air is first admitted through the pipe opening in the entrance to the discharge pipe, and thereafter through the others progressively to the rear as the concrete subsiding in front of them is driven out through the discharge pipe.

Plaintiff's contentions as they appear in its brief are that McMichael invented (1) the hopper-bottomed container; (2) application of compressed air to convey concrete; and (3) the method of the lower air to detach portions of the concrete, which alternating with like slugs of air, are driven through the discharge pipe.

In respect to the first, containers with hopper bottoms to direct the flow of their contents preceded McMichael for time so long, the memory of man runneth not to the contrary.

In respect to the second, long prior to McMichael were many devices more or less like his, in which the art of compressed air to convey mobile substances was developed and used. Whether or not it had yet been applied to concrete, to the latter is but a new and analogous use, devoid of novelty or invention. The affinity and analogy of concrete to other mobile substances, commonly thus conveyed, was recognized by McMichael himself in his association of it with sand and other granular materials in his original application. His subsequent exclusion of all but concrete of those so associated is suggestive of preparation for litigation to come. To extend the art to concrete when it came into extensive use, not invention, but only common sense, to say nothing of ordinary mechanical skill to be expected in the progress of the art, was required. In principle, it differs none from like extension of the use of a wheelbarrow to convey concrete. For a principle, appliance and method, applied to substances in general, will naturally embrace any new substance, even as a statute relating to a genus will open to include newly created species.

The instant case cannot be distinguished in principle from Concrete, etc., Co. *v.* Gomery, 269 U. S. 177, 46 S. Ct. 42, 70 L. Ed. 222, wherein it is held that appliances and method of conveying mobile substances by gravity extended to concrete when it came into use, and a subsequent patent to thus convey concrete is invalid. For gravity, substitute compressed air, and that case "reads on" this.

Moreover, prior to McMichael were patents for appliances and methods to convey concrete by the agency of compressed air. Amongst these are Smith, 122,498 of 1872, Cannif, 873,345 of 1906, and McIlvrid, 958,421 of

1905. In so far as it is argued that some of these are for grout, and will not function with less liquid concrete, the answer is they can be used for any practical flowable concrete, and they have been. They are of the simplicity of McMichael's, and even average intelligence will perceive their ability to operate successfully.

The variety of concrete is not material, save in respect to the mere incidentals of pressure and size of container, load, and discharge conduit. In any apparatus, including McMichael, the concrete must be flowable in quality, and the pressure in due proportion to the weight and friction of the load ahead of it. To suit these incidentals to circumstances is mechanical, and not invention. And this is true, be the container capacity or load discharged in one slug (continuous stream) or in several shorter slugs.

Adverting to the third of plaintiff's contentions, the first observation is that the slug theory is not proven and is untenable. With 100 pounds of air from the primary upper air pipe behind it, the concrete stands not on the order of its going, but goes at once, and through the discharge pipe "with great rapidity and speed." In these circumstances, the upper air does not halt until the lower air has neatly cut off and removed a slug of concrete, nor does the lower air, of like pressure from the common reservoir, halt until within the field of its activity has been projected sufficient concrete to form any slug.

In the nature of things, the patent now stipulating what the application originally did not, viz. simultaneous and constant application of both upper and lower air, the lower air can but some disintegrate and aerate the mass of concrete as it rushes by, and thereby lubricate, lighten, and assist its flow through the conduit. The lower air

but joins and flows in the same direction and with the stream of concrete. It may be that, if the upper and lower air were alternately applied, some quasi slug action would follow, akin to the action of Saunders' "air-lift pump," patent 597,023 of 1896, but not when simultaneously applied as here.

Taking McMichael as it is, to expect or secure movement of the concrete in alternate slugs of concrete and air would do violence to the laws of nature and confound reason. It cannot be done. Moreover, the proof is clear, by plaintiff's witness as by defendant's, and some who are interested in plaintiff, that the concrete discharges in a continuous aerated or mixed stream of concrete and air, and not at all in any slug formation.

As between Wilkin's test, discrediting the slug theory, and Ray's, supporting it, the former's is calculated to more nearly approach accuracy. Evidently McMichael "found" the basis of the slug theory in Leake, and his claim aforesaid by the Commissioner presented to and adopted by McMichael. Until then McMichael did not suggest that the lower air had any such function or result; until then, he limited the lower air in some undefined volume and pressure to only some time use if the material chanced to pack in the hopper, to blow through the material and loosen it, in function, object, and result, nothing but a convenient substitute for a crowbar.

To thereafter broaden his claims, to embrace the idea and method of Leake, avails McMichael nothing. See Hobbs *v.* Beach, 180 U. S. 396, 21 S. Ct. 409, 45 L. Ed. 586. The impression irresistibly created by the facts is that, after knowledge of Leake, all McMichael's amendments were to include Leake's idea and method, and to exclude from McMichael's original application all possible that

was inconsistent therewith. Be that as it may, that in McMichael as in Leake the lower air serves a useful purpose clearly appears; but, as between them, in its present aspect in McMichael it is the idea and method of Leake, and not McMichael, in that, prior to McMichael, Leake had conceived the idea, and in 1905 in New Orleans had publicly and successfully employed it in concrete building operations.

For, despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence in quality and quantity inspires confidence and constrains conviction of the truth of the fact and beyond reasonable doubt. Neither of them, however, is inventor of the thing. Before them, it was old in the art.

Amongst many patents asserted to be anticipatory of the idea and use of the lower air, but three need be considered. Of these, the first and second are Duckham's English patents 4,100 of 1875, and 15,348 of 1885. They are for apparatus and method to convey the spoil or mud excavated in dredging. To that end are employed a container for the material, compressed air above or behind it to drive it down to and through the discharge pipe, and like air through several nozzles in the bottom and pointing towards the discharge pipe, "to keep the mud agitated and prevent any thick deposit in the tank."

The third is Kolsche's German patent, 18,394 of 1882, for "apparatus for conveying substances, slack, sandy, or granular material, by means of a current of air." The apparatus is like McMichael's, without the U-bend; that is, it is an upright cylindrical container, with hopper bottom terminating in a discharge pipe. Compressed air is applied above or behind the material in the container, to force it down and into the discharge pipe, and at that

point like air is admitted to assist in driving the material through the pipe.

Without any change, perhaps, save adjustments to circumstances as always, Kolsche's apparatus and method will transport concrete as does McMichael's. Kolsche could rightfully devote it to that analogous use. It follows that McMichael's essentially unchanged application of Kolsche to analogous materials and uses, is not invention. In principle, essential design, function, operation, object, and result, Kolsche and McMichael are one and the same. Either reads on the other. Kolsche, if later and devoted to concrete, might infringe McMichael, and by the same token, being earlier, he anticipates him.

The same is true of Duckham, especially in respect to McMichael's application originally, and their common use of the lower air to prevent or relieve packing of the material. It must be remembered that the test of "analogous uses" is not from whence comes and where goes the materials, to what ultimate end or use, or their nature, but is the *method* of conveyance. Although fertilizer and flour be unlike, and for ends as wide apart as the poles, a wheelbarrow conveying both is devoted to analogous uses, in patent law.

In so far as the third contention counts upon nonseparation of the components in the discharge pipe, this result is imputed to non-existent slug action, and is inconsistent with the claim that the ingredients continue in active mixation throughout the pipe. But note that in the original application this function of the U-bend was in relation to *granular* material only, and, with the latter's elimination from the patent, the function was likewise eliminated. It may be added that the nonseparation of components of *plastic* materials is due to that mutual

cohesiveness which granular materials do not possess. All the elements of McMichael are old. It does not appear that he discovered, invented, combined, or made anything new.

That serves to dispose of the case, and the defense of noninfringement needs no more consideration than to note that Hackley's apparatus is a different combination than McMichael's, has no upright cylindrical hopper bottomed container, is without the U-bend, employs no upper air, save some incidental back pressure, does not discharge slug fashion, as claimed is the invention of McMichael, and so does not infringe. Likewise of the defense of insufficient supplemental oath to McMichael. It is noted that this was required by the Commissioner, February 18, 1911, was supplied by Bliss, February 17, 1912, purports to have been executed by McMichael, of Toledo, before Bliss, Jr., in Chicago, March 6, 1911, discloses in some lettering and spelling of McMichael's signature, striking differences from his signature to his application, applies to only part of the claims, and that McMichael some time died.

The finding and conclusion are that the claims in suit are void for want of novelty and invention.

Decree accordingly.

IN THE

UNITED STATES CIRCUIT COURT OF APPEALS,

FOR THE NINTH CIRCUIT.

CONCRETE MIXING AND CONVEYING COMPANY (a Corporation), *Appellant*, v. R. C. STORRIE & COMPANY (a Partnership), *Appellee*.	No. 5425.

LYNN A. WILLIAMS, C. C. BRADBURY and A. G. McCALEB, of Chicago, Illinois, Attorneys for Plaintiff-Appellant.

CHAS. E. TOWNSEND of San Francisco, Attorney for Defendant.

Before GILBERT, RUDKIN and DIETRICH, Circuit Judges.

The appellant brought a suit alleging infringement of Claims 1, 2, 17, 18, 21, 29 and 35 of Patent No. 1,127,660, issued February 9, 1915, to John H. McMichael, assignor, for a "Method of, and an apparatus for, transporting and treating concrete." The application was filed January 14, 1907, and was pending in the Patent Office more than eight years. As originally filed, the application was for "Improvements in apparatus for transporting granular and plastic building material, such as sand, plaster, mortar and concrete." The apparatus, as patented, consists of a vertical closed cylinder, tapering toward the base, to discharge into a U-bend connected with a conduit

having an air nozzle at the top of the cylinder and an air nozzle near the entrance to the U-bend, each separately controlled, under pressure of which the concrete material in the chamber is forced through the conduit and carried to the point where it is to be deposited. It was claimed that the appellee infringed by use of the device as described in Letters Patent No. 1,619,297, issued March 1, 1927, to Roy C. Hackley, for a "Concrete Gun," which consists of a horizontally disposed oblong tank, ovoid in cross section, with the narrow portion disposed downwardly and with a tapering nozzle to which is connected a discharge pipe for conveying the concrete. Air pressure is furnished by four air supply pipes extending within and along the bottom of the container and terminated at different points intermediate the ends of the tank. Into the pipe which terminates nearest the exit the air is first admitted and thereafter into the others in their order until all the concrete is driven into the discharge pipe. In the specifications it is said that the pipe which terminates near the nozzle insures that pressure shall always be present there directing the concrete into the discharge pipe, and that the remaining pipes serve to advance the body of concrete along the bottom of the tank until the tank is completely emptied. The containers in both the appellant's and the appellee's patents are filled with concrete through openings in the top which are then closed by air-tight lids. At the close of the trial the court below found the appellant's patent anticipated and invalid, and that, even conceding its validity, it had not been infringed by the appellee (Concrete Mixing & Conveying Co. *v.* R. C. Storrie & Co., 23 Fed. 2d 131).

GILBERT, Circuit Judge, after stating the facts:

In the prior art were shown numerous patents involv-

ing the use of compressed air for conveying through pipes a wide variety of materials such as concrete, crude oil, dredge spoil, sand and water, grain, molten sulphur, etc. As to all prior patents the appellant insists that none is anticipatory of its combination, for that they all lack the salient feature thereof, the arch-breaking nozzle or anything that could exercise the function thereof. Of the prior patents we find it necessary to refer particularly to but three, the patent to Smith, No. 122,498, of January 2, 1872, and the English patents to Duckham, one, No. 4,400, of 1875, and one, No. 15,348, of 1885. The Smith patent was for "An improvement in the manufacture of concrete pavements and machinery for same." The specifications described the apparatus as specially adapted to the manufacture and convection of concrete composition through pipes so as to set quickly upon reaching its destination and form a solid mass of artificial stone, and uncontradicted testimony was given of the successful use of the Smith machine in conveying concrete through a pipe by compressed air. The device contained all the features of the appellant's patent except the nozzle for admission of air near the point of exit. The Duckham patent of 1875 was for improvements in discharging mud or soil from dredges. The mud was received in tanks capable of being closed air-tight, with the exception of inlets for the compressed air and an outlet for the spoils. In the specifications Duckham said, "I prefer to inject compressed air * * * through a number of nozzles at the bottom of the tank, said nozzles being pointed toward the outlet. By this means the particles are prohibited from settling and are kept in suspension until the whole is expelled from the tank. Compressed air may, moreover, be admitted into the discharge pipe with the same object." We

think it indisputable that Duckham, in prescribing the use of pipes for the admission of compressed air in the tank, the same distributed along the bottom of the tank and one of them locatable at the exit, presented the use of all that is included in the appellant's combination, save and except the U-bend, an exception which is negligible so far as the present litigation is concerned, and if there is distinction in the fact that Duckham used no air pressure above the contents of the tank and thus omitted one of the features of the appellant's combination, that feature is also absent from the Hackley combination used by the appellee. But the appellant asserts that Duckham was working with a material which would flow with facility and that the nozzles which he used were intended for no other purpose than to stir up the mud in the bottom of the tank. It is true that Duckham was engaged in moving a material quite different from concrete, but that fact is not of importance on a question of anticipation (Concrete Appliances Co. *v.* Gomery, 269 U. S. 177). In his second patent of December 14, 1885, Duckham says: "The mud or spoil was received directly from the dredging buckets in a tank or tanks, whence it was expelled through outlet pipes by means of compressed air admitted at the upper part of the tank, assisted by compressed air and water injected at the bottom of the tank to agitate the mud and prevent thick deposit," and, if we may refer to the Engineering Publication Minutes of the Proceedings of the Institution of Civil Engineers (1887), in evidence here, we find that Duckham stated that "with clay or stiff mud, if the nozzles of the air-injection pipes were too small, the compressed air, instead of driving out the material, simply pierced holes through it, escaping through the discharge pipe and carrying along with it all

the liquid and thin material in the tanks. This defect was easily rectified by rearranging and increasing the size of the large injection nozzles, and the apparatus now gives most satisfactory results."

It is assigned as error that the trial court found that Leake had made the invention in issue prior to the date of McMichael's application. In the opinion of the trial court it is said, "Prior to McMichael, Leake had conceived the idea and in 1905 in New Orleans had publicly and successfully employed it in concrete building operations, for despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence, in quality and quantity, inspires confidence and constrains conviction of the truth of the fact, and beyond reasonable doubt." The McMichael application was filed January 14, 1907, and nine months later, on October 7, 1907, was filed Leake's application, which presented everything contained in the McMichael application with the exception of the U-bend. Leake said: "The object of my invention is to provide a method and apparatus for preparing a concrete mixture and delivering it while in a plastic condition to the place where it is to be utilized. Another object of my invention is to move plastic concrete from one place to another by means of air pressure." On May 12, 1909, interference was declared between McMichael and Leake and Wm. W. Darley, who had applied for a patent on "apparatus for handling ashes and other materials." Leake and Darley each filed an affidavit setting forth their respective dates of conception and reduction to practice. Darley was dismissed from the interference as being found subsequent in time to the others. Leake's affidavit stated that he "conceived the invention set forth in the declaration of interference on or about the 1st day of February, 1905,

that he first made drawings of the invention on or about the 1st day of March, 1905, and first explained the invention to others on or about the 1st day of June, 1905, that he first embodied his invention in a full-sized machine, which was completed on or about the 1st day of September, 1905, and that on or about the 1st day of September, 1905, the said machine was first successfully operated in the City of New Orleans, and State of Louisiana, and that he has since made and used other machines embodying the same invention." Before the interference was declared it was represented on behalf of Leake's application that he had done a large amount of experimental work in connection with his invention. "He has successfully moved concrete from the place where it is mixed to the place where it is to be used, by means of air pressure, using the apparatus disclosed in his application." Again it was said: "He has given considerable time and thought to this matter and has actually constructed several plants where this is done. Their operation is highly successful and appears to be a decided improvement over previously known methods for handling plastic concrete." But no showing was made or evidence offered to carry the McMichael invention further back than the date of his application nor was any proceeding had in the Patent Office upon his application until 19 months thereafter when, for a consideration of $6,000, Leake assigned his application to McMichael's attorney, who later assigned it to the appellant, which had also become the owner of the McMichael application. The long period of inaction and silence on the part of McMichael, unexplained as it is, together with the payment to Leake of so large a sum of money as $6,000, payable, as it was, in annual installments until March 1, 1920, is strongly suggestive of the

inference that McMichael recognized the priority of Leake's invention and could furnish no proof to the contrary. As a witness for the appellee in the court below, Leake testified that he conceived the idea of moving concrete as set forth in his application, about February 1, 1905; that he made a container in which to put the concrete and by the means of an air pipe extending therefrom shot it up on top of a powerhouse then being constructed in New Orleans; that when the air pressure was applied, the concrete all went up and landed on there; that later he built a commercial apparatus in Chicago and operated it in conveying dry cinders to the fifth floor of a building. His testimony, together with his preliminary statement, carried the date of his invention back of that of McMichael and showed an actual reduction to practice by Leake as early as 1905. We find no ground for disturbing the trial court's conclusion. The question at issue was, which of two applicants for patent was the inventor? Both presented drawings and plans of the same invention. Leake furnished evidence of the time, place and circumstances of the reduction of his invention to practice. There was no denial of the truth of his testimony. In *Armstrong* v. *De Forest Radio Telephone & Tel. Co.*, 280 Fed. 584, 590, it was said: "While it is true that uncorroborated testimony of an inventor is to be accepted with caution * * * yet there is no rule of law that requires the rejection of the uncorroborated testimony of an inventor as to the date of its conception. The Court must be satisfied as to the fact of the demonstration and that the conception was complete." In *Reed* v. *Cutter*, 1 Story 590, 596, Mr. Justice STORY said: "If the invention is effected and put into actual use by the first and original inventor, it is of no consequence whether the in-

vention is extensively known or used, or whether the knowledge or use thereof is limited to a few persons, or even to the first inventor himself." So in *C. F. Mueller Co.* v. *A. Seregas Sons*, 12 Fed. (2d) 517, 518, considering the question which of two was the real inventor, Judge HOUGH said: "The question of invention as between Mueller and Wild is really only one of veracity. There are no presumptions or artificial rules regulating such an investigation, and the evidence of one witness may be sufficient," citing *Thompkins* v. *N. Y. Woven Wire, etc., Co.*, 159 Fed. 133. That the testimony of one witness may be sufficient in such a case is held in *Mayor* v. *A. & H. G. Mutschler*, 248 Fed. 911, 914, where it was said that one witness may suffice if the surrounding circumstances are confirmatory.

But it is insisted that neither Leake's combination nor that of Duckham can operate successfully, as does that of the appellant, to convey concrete and pack it at the place where delivered more effectively than could be done by hand tamping, a result which, it is said, is accomplished by the appellant's delivery of the concrete with velocity and momentum in successive slugs or parcels. The tiral judge held that the slug theory is not proven and is untenable, and said, "It may be that if the upper and lower air were alternately applied some quasi-slug action will follow, akin to the action of Saunders' air-lift pump, Patent 597,123 of 1896, but not when simultaneously applied, as here." There was no suggestion of a slug theory in the original application of McMichael, but when the patent was issued, more than eight years later, it was stated in the specifications that the lower air pipe adjacent to the discharge duct "serves the double function of preventing choking in the entrance to the delivery pipe

and of supplying air under pressure in sharp jets directly to the delivery pipe itself." The slug theory was obviously adopted, from expressions found in Leake's application in which he proposed the use of a combination consisting of two tanks discharging into a single conduit alternately, by means of which the main body of concrete "can be detached in portions and blown into the conduit and driven along the same." Such a result might be accomplished by the use of his combination, but it is not apparent that any slug action occurs in the use of either the McMichael or the Hackley combination. In neither is there intermittent pressure or "sharp jets" of air and in both there must necessarily be exerted a steady and continuous force from the upper and the lower air nozzles combining to drive forward the concrete and deliver it in a practically unbroken stream, and if, indeed, a temporary obstruction of material at the exit should occur it is not believed that its release would result in a slug action or a constantly intermittent propulsion of concrete, or that if such an intermittent action could in practice be accomplished any advantage would thereby be attained. The decided weight of the testimony is to the contrary. It is stated in the brief of appellant's counsel that the appellee's engineer, Hackley, admitted that the appellant's apparatus "operates on the slug principle." We do not so understand Hackley's testimony. What he said was that the air mixes with the concrete and as such prevents it from discharging as a solid mass, and that "the mass is broken up into portions which are driven ahead under high velocity by the air discharging from the pipe 34, this being of considerable importance as it positively prevents choking or blocking up of the apparatus." Hackley was speaking only of such breaking up of the discharging

column as resulted from the admixture of air and concrete in the discharge pipe. He testified to having had experience in using the applicant's combination and that in so using it the concrete issued in a continuous stream and that in the use of his own device the concrete came out in a continuous stream mixed with the air, that the speed of the discharge thereof could be controlled by the operation of the valves and in use was so controlled as to make it as slow as possible for the purpose of preventing separation of the concrete and to prevent wear on the pipes, and that when the concrete is discharged it flows by gravity down the sides. Brock, a witness for the appellant, testified that in the Skagit tunnel the concrete, when it came out through the 8-inch discharge pipe, "flowed down gently like over both sides." And such was the testimony of all the witnesses who observed the operation of the device in the Skagit tunnel. In fact, there is but one witness for the slug theory, Ray, a consulting engineer and patent expert. He testified, in answer to the question: "How many slugs moved in a second?" "There may be twenty or thirty come out in a second. Then there will be a lapse of a second or two when none will pass through. Then there will generally be a group of two or more in the next quarter second. * * * It is impossible for the naked eye to detect the individual slugs of material issuing from the discharge end of the duct." Wilkins, an electrical engineer, an expert, testified, on behalf of the appellee, that he was familiar with the apparatus in controversy and had made tests in its operation, that in the use thereof there were no slugs or plugs such as Ray had testified to, that it was a continuous flow of the mixture of air and concrete, and that it issued from the discharge pipe without spurts or

dumps. The court below credited the testimony of Wilkins as against Ray, and we think the court was supported by the overwhelming weight of the testimony.

We think that the slug theory, when all is said, has no bearing upon the merits of the present controversy, for whether or not the appellant's apparatus operated to deliver concrete in slugs or sections, it is very clear that the Hackley apparatus operates in delivering a constant stream of concrete, interrupted only so far as it is interfered with by the air which accompanies it through the discharge pipe. Hackley used a horizontal tank and in his specifications he said: "With the present apparatus the concrete does not tend to pack or bridge around the nozzle as is the case where vertical tanks are used. The mass of concrete which any one air stream is compelled to move is relatively small and unpacked, and therefore the device operates quickly and easily and without danger of becoming clogged." The decisions in Concrete Mixing & Conveying Co. *v.* Ulen Contracting Corp., 12 Fed. ,2d) 929, and Concrete Mixing & Conveying Co. *v.* The Powers-Kennedy Company, relied upon by the appellant, were based on records widely different from that in the case at bar.

The decree is affirmed.

(Endorsed): Opinion filed August 20, 1928. Paul P. O'Brien, Clerk.

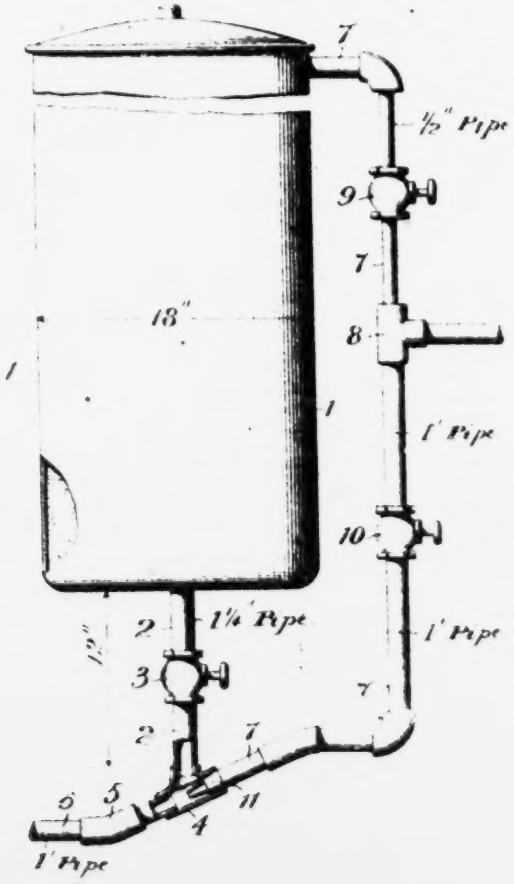
No. 747,396. PATENTED DEC. 22, 1903.

N. FARNHAM.

SAND BLAST APPARATUS.

APPLICATION FILED APR. 10, 1903.

NO MODEL.



WITNESSES

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W. C. Parker.

INVENTOR

Neal Farnham

by W. G. Hardman, Attorney

No. 747,396. Patented December 22, 1903.

UNITED STATES PATENT OFFICE.

NEAL FARNHAM, OF CHICAGO, ILLINOIS.

SAND-BLAST APPARATU.

SPECIFICATION forming part of Letters Patent No. 747,396, dated December 22, 1903.

Application filed April 10, 1903. Serial No. 151,998. (No model.)

To all whom it may concern:

Be it known that I, NEAL FARNHAM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sand-Blast Apparatus; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the figures of reference marked thereon, which forms a part of this specification.

My invention relates to a sand-blast apparatus; and it has for its object to produce such an apparatus in which the sand will pass from the reservoir or tank by gravity alone or by gravity aided by compressed air within the reservoir under regulation, the sand passing from the tank through a delivery-pipe leading to a blast-pipe provided with a blast nozzle or jet whose point of discharge is substantially beneath the discharge of the delivery-pipe into the blast-pipe, so as to prevent any backflow of air from the sand-carrying pipe or hose into the delivery-pipe and at the same time permitting the air-blast from the blast-nozzle to impact against the sand as it flows from the discharge-pipe, so as to drive it through the sand-carrying hose to the point of its application.

It has, further, for its purpose to provide a coupling between the vertical discharge-pipe leading from the sand-tank, the sand-carrying hose, and the air-blast-supply pipe, arranged so that the coupling will stand at an oblique angle to the longitudinal axis of the discharge-pipe, whereby the air-blast will be projected at an oblique angle across the discharge-mouth of the vertical discharge-pipe, the purpose of the first and second stated objects being to facilitate the freer passage of the sand from the tank through the discharge and into the sand-carrying hose and without clogging of the sand at either end of the discharge-pipe, which otherwise would be liable to occur by reason of back pressure of air in the discharge-pipe and condensation of moisture in the air-blast.

To the accomplishment of the foregoing and such other objects as may hereinafter appear the invention consists in the construction and in the arrangement of parts hereinafter particularly described and then sought to be clearly defined by the claims, reference being had to the accompanying drawing, forming a part hereof, and in which the figure is a side elevation of a sand-tank having my invention applied, a portion of the upper part of the tank being broken away.

In the drawing the numeral 1 designates a tank of any suitable configuration and dimensions designed to hold the sand. From the bottom of the tank leads a discharge-pipe 2, provided with suitable valves or valve 3 to regulate the flow of sand through the pipe. To the lower end of the discharge-pipe is attached a Y-coupling 4, which is inclined to the pipe 2 and, as shown, stands obliquely or at an angle of about forty-five degrees, more or less, to the longitudinal axis of the discharge-pipe. To one end of this coupling is attached, by a nipple 5 or otherwise, a sand-carrying hose 6 of any desired length to lead to the point of application of the sand-blast, which hose may be of pliable material or of rigid material provided with any desired number of flexible joints 6. To the other end of the coupling is connected an air-blast pipe 7, to which compressed air is supplied through a T or other coupling 8 from a suitable source of supply. The other end of the pipe 7 opens into the upper part of the tank 1, and said pipe is provided with a valve 9, by which the supply of air to the tank may be regulated or entirely cut off, and it is also provided with a valve 10, by which the supply of compressed air to the blast-nozzle may be controlled. At the point where the air-blast pipe 7 connects with the inclined coupling 4 it is provided with a nozzle or jet 11, which enters the coupling, so that its point of discharge will lie below the discharge-mouth of the discharge-pipe 2, leading from the tank, the best results being obtained when its point of discharge is about midway of the discharge-mouth of the discharge-pipe. By thus positioning the air-blast nozzle the air is projected across the mouth of the discharge-pipe 2 without the blast passing up into the discharge-pipe and at the same time creates a suction across the discharge-pipe and down through the same, so that the downflow of the sand through the

pipe is greatly facilitated. At the same time the force of the air-blast from the nozzle across the mouth of the discharge-pipe strikes the sand as it issues from the mouth of the pipe and propels it with velocity away from the pipe and through the carrying-hose and prevents any backflow or back pressure from the hose or coupling and into the discharge-pipe. If this back pressure were permitted, it would not only retard the flow of the sand, but it would also result in the sand becoming moist from condensation of the compressed air, and thus the pipe would become clogged and the efficient working of the device interfered with. The inclination of the coupling at the lower end of the discharge-pipe also aids in the rapid flow of the sand from the mouth of the discharge-pipe, so as to aid in preventing backflow or back pressure of air.

By adjustment of the valve 9 more or less pressure of air may be admitted to the tank to assist the outflow of sand therefrom and its outflow regulated to a nicety, or the air may be entirely cut off from the tank.

The tank may be supported from the ground upon any suitable stand or otherwise supported.

I have indicated on the drawing the preferred dimensions of the parts; but they may be varied within reasonable limits.

Having described my invention and set forth its merits, what I claim is—

1. A sand-blast apparatus comprising the tank, the discharge-pipe leading from it, the compressed-air-supply pipe, sand-carrying hose, and the air-blast nozzle having its point of discharge beneath the mouth of the discharge-pipe leading from the tank, substantially as described.

2. A sand-blast apparatus comprising the tank, the discharge-pipe leading from it, the inclined coupling at the lower end of the discharge-pipe, the compressed-air-supply pipe, the sand-carrying hose, and the air-blast nozzle entering the inclined coupling and having its point of discharge beneath the mouth of the discharge-pipe leading from the tank, substantially as described.

3. A sand-blast apparatus comprising the tank, the discharge-pipe leading from it, the sand-carrying hose, the compressed-air-supply pipe opening into the upper part of the tank and having the upper and lower controlling-valves, the inclined coupling between the sand-carrying hose, the compressed-air-supply pipe and the discharge-pipe from the tank, and the air-blast nozzle having its point of discharge in the inclined coupling beneath the mouth of the discharge-pipe from the tank, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

NEAL FARNHAM

Witnesses:

W. G. HOLLISON,

[illegible]

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FILED
FEB 15 1929

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1928

No. 501

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK

Petitioners

against

CONCRETE MIXING AND CONVEYING COMPANY

Respondent

BRIEF FOR PETITIONERS

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Supreme Court of the United States

OCTOBER TERM, 1928.

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, *Petitioners,* *against* CONCRETE MIXING AND CONVEYING COMPANY, *Respondent.*	No. 501.

BRIEF FOR PETITIONERS.

May It Please the Court:

This case comes before your Honors on writ of certiorari issued to the Court of Appeals for the Second Circuit, based on conflicting decisions of that Court and of the Court of Appeals for the Ninth Circuit as to the validity of Patent No. 1,127,660 to McMichael, dated February 9, 1915.

Opinions of Lower Courts.

The opinion of the District Court for the Southern District of New York, holding the patent valid and infringed, has not been published, but is found in the Record, page 417. The opinion of the Circuit Court of Appeals for the Second Circuit, affirming the decree of the District Court is found in 27 Fed. (2) 668 (R. 444). The

opinion of the District Court for the Western District of Washington, holding the patent invalid, is found in 23 Fed. (2) 131, and the opinion of the Circuit Court of Appeals for the Ninth Circuit, affirming the District Court, is found in 27 Fed. (2) 838. Copies of all these decisions are printed in the appendix to our petition for the writ of certiorari (pp. 15-33).

Jurisdiction of This Court.

The jurisdiction of this Court was invoked by petition for writ of certiorari, based on the conflicting decisions as to the validity of the patent, rendered by the Courts of Appeals for the Second Circuit and the Ninth Circuit, hereinbefore referred to, and thereupon a writ of certiorari was granted by this Honorable Court on December 10, 1928. The date of the judgment to be reviewed is July 24, 1928, being the decree and order for mandate of the Circuit Court of Appeals for the Second Circuit (R. 348, said order affirming the decree of the District Court for the Southern District of New York, dated March 19, 1927 (R. 332 finding Claims 2, 4, 6, 17, 21, 22, 28, 34 and 35, of the McMichael patent valid and infringed.

The rulings of the Court of Appeals for the Second Circuit relied on as the basis of this Court's jurisdiction are the affirmance, by its said order of July 24, 1928 (R. 450), of the decree of the District Court for the Southern District of New York (R. 332 holding Claims 2, 4, 6, 17, 21, 22, 28, 34 and 35 of said McMichael patent valid and infringed by your petitioners.

The statutory provision relied upon is Judicial Code, Section 240.

A recent authority of this Court supporting our position on jurisdiction is *Concrete Appliances Co.* v. *Gomery*, 269

U. S. 177, wherein the writ of certiorari issued on conflicting decisions of the Circuit Courts of Appeals for the Third and Sixth Circuits, respectively.

Statement of the Case.

(We have endeavored to make this statement concise, but the material points are fairly numerous, as is often the case in patent suits.)

1. The McMichael patent was applied for January 14, 1907, and in the application *as filed*, he stated (Ulen Record, Exhibit D, p. 199):

> "The invention relates to apparatus for elevating and transporting *granular and plastic* building material, such as *sand, plaster, mortar and concrete.*" (Italics ours.)

2. The McMichael patent (R. 283 is for a very simple apparatus for pneumatically transporting (*i. e.*, "blowing" or "shooting" as it is called in the practical art) granular and plastic material. It consists essentially of a generally cylindrical chamber 1 (using the reference numerals of the patent) having a door 3 for introduction of the granular or plastic material, a delivery pipe 13, opening from the bottom of the chamber, into and through which the material is "blown" away to the desired place of deposition, and two pipes 8 and 10, both of which supply compressed air *within the chamber 1*, to "blow" the concrete into and through the delivery pipe.

3. *The McMichael patent, both as to mechanism and method of operation, is not a pioneer patent for pneumatically blowing concrete, or any other material, but is only a mere appropriation of the devices and methods of the prior patents.*

1. The method of pneumatically "blowing" concrete, and a mechanism for effecting it, *were old and well known long before the McMichael patent.* They were first disclosed in Smith Patent 122,498 *substantially as practiced by all, even the respondent, today.* That patent shows the cylindrical chamber, the delivery pipe through which the material is "blown," and *one* pipe for supplying compressed air.

5. The only *real* improvement which has since been made over Fig. 4 of Smith 122,498 is the introduction of the *second* compressed air pipe *into the bend of Smith's delivery pipe D. That improvement was not invented by McMichael but was made long prior to him.* It is not even disclosed in McMichael's patent, *but was disclosed long prior to him* in Beach, 267,318 (R 305 ; Farnham, 747,396; Warren, 671,303; Goldie, 707,840 in the rear of this brief.

5-a. The teaching is clear from these earlier and *expired* patents that granular, plastic and fluent materials, such as concrete, cement, grain, sand, can *all* be pneumatically blown by the *same* apparatus, that is, a chamber, having a bent delivery pipe, a compressed air pipe blowing into the chamber, to put pressure on top of the material in the chamber, and another blowing into the bend of the delivery pipe, to propel the material which is already in the pipe. But either of the compressed air pipes may be omitted, if desired.

5-b. The method of making *liquid or semi-liquid* concrete and the advantages of it in pneumatic blowing were disclosed in Smith, 122,497. *Petitioner is using approximately Smith's formula for its liquid concrete* (R. 297, 2d column, and R.206, fol. 270).

6. *Substantially identical apparatus* with that of McMichael, *operating in the identical manner*, for pneumatically transporting or "blowing" both granular and plastic materials are numerous and old in the prior art. That is, the prior art devices are substantially identical with plaintiff-respondent's device, but they are more efficient than the McMichael patented device. Examples of the prior art (later fully discussed in the "Argument") are:

U. S. Patent 122,498 to Smith, January 2, 1872 (R. 300) for blowing concrete;

U. S. Patent 267,318 to Beach, November 14, 1882 (R. 305) for blowing all kinds of material, including "mail matter" and grain (R. 396, lines 8-19; p. 397, lines 100-107);

U. S. Patent 599,055 to Davidson, February 15, 1898 (R. 312;

U. S. Patent 873,345 to Canniff, December 10, 1907 (R. 318, for blowing "grout" (a kind of concrete);

U. S. Patent 958,421 to McIlvrid, May 17, 1910 (R. 323, for the same purposes;

U. S. Patent 671,303 to Warren, April 2, 1901 (End of this Brief);

U. S. Patent 707,840 to Goldie, August 26, 1902 (End of this Brief);

U. S. Patent 747,396 to Farnham, December 22, 1903 (End of this Brief);

British Patent 12,758 of 1894 (Ulen Record, Exhibit D, pp. 381-387.

7. These prior patents show clearly that the pneumatic "blowing" of *all kinds* of materials, solid, granular, plastic, including concrete, grout, sand, grain, tea, "mail matter," and what-not, was widely and generally practiced, and these prior patents show only minor variations in the old and standard form of a sheet iron air-tight chamber,

a bent discharge or delivery pipe into which the material passes from the bottom part of the chamber, and one or two compressed air supplying pipes, *the location of which are varied as desired in the various patents.* The only feature of McMichael's structure not shown in the prior patents is the lower compressed air pipe 10, *discharging into the material within the chamber* (R. 283 and 284 lines 60-63). That appears to be a retrogression, rather than an advance in the art.

8. Petitioners *do not use this single novel feature* of the McMichael patent, but are using substantially the structure of prior patents to Smith, 122,497 and 122,498; Warren, 671,303; Farnham, 747,396, and Goldie, 707,840, *ibid.*, as petitioners' compressed air pipe discharges into the bend of the delivery pipe, as in most of the patents mentioned.

9. Respondent itself in its commercial apparatus (Ulen Record, Exhibit D, p. 194) has abandoned this trivial novel feature of its McMichael patent, and has practically copied the standard structures of the prior patents, namely, the chamber, the bent delivery pipe, one compressed air pipe discharging into the chamber, and another compressed air pipe *discharging into the bend of the delivery pipe* (Ulen Record, Exhibit D, pp. 184, 194). It is clear that respondent is not commercially under its own patent.

9-a. Respondent's main departure in its commercial apparatus from its own patent consists in introducing the lower compressed air directly *into the bend of the discharge pipe* and in the longitudinal direction thereof, thereby abandoning the one novel feature of the McMichael patent, and adopting *a structure and principle of operation old in many patents, e. g.,* Beach, 267,318;

Warren, 671,303; Farnham, 747,396; Goldie, 707,840, *ibid.*, British 12,758 of 1894, Fig. 8 (Ulen Record, Exhibit D, p. 387); *but is not disclosed in the McMichael patent in suit* (R.283-291

9-b. There is persuasive, if not conclusive, evidence, that the McMichael structure as disclosed in the patent in suit is inoperative (R. pp.52-55 This is supported by respondent's commercial non-utilization of that form, and its use of that in evidence (Ulen Record, Exhibit D, p. 194).

10. The "slug" method of conveying concrete *relied on throughout all the litigation below as the essential principle of the McMichael patent, is absolutely lacking from the McMichael patent as filed,* and was first inserted therein by amendment "D," filed January 24, 1911 (Ulen Record, Exhibit D, pp. 219-232) *four years after the filing of the application.*

10-a. *The McMichael patent is invalid in law by reason of the insertion of this new matter,* four years after filing, upon which new disclosure and the claims supported thereby, all the infringement suits have been based.

10-b. This illegal insertion of new matter in 1911, and as added to in 1913, includes R. page 285 lines 9-20, lines 25-130, R. page 286 *the entire page;* R. page 287 lines 1-76, being almost the entire patent (Ulen Record, Exhibit D, pp. 199-270).

11. Petitioners' apparatus (R.294) does *not* utilize *any* feature of a pneumatic blower which is novel in the McMichael patent.

11-a. Petitioners do not use any compressed air above the concrete in the chamber (R.201-207 *even if they*

did, they would be practicing the invention of Smith's patent 122,498 and not that of McMichael's.

11-b. Petitioners do *not* discharge *any* compressed air *into the concrete containing chamber*, but on the contrary, their *only* compressed air is discharged *into the bend* of the *discharge pipe* (R. 293), and in doing so, they are using the expired patents to Beach, 267,318 (R. 395); Warren, 671,303; Farnham, 747,396; Goldie, 707,840; *and this feature is not disclosed in the McMichael patent.*

11-c. It is true that in this feature of blowing compressed air into the bend of the delivery pipe, petitioners' and respondent's commercial apparatus are alike, *but they both are using this old feature* of the Beach, Warren, Farnham and Goldie *expired* patents, *which feature*, as stated, *is not disclosed in the McMichael patent.*

12. Petitioners use *only one* compressed air pipe, discharging into the bend of the discharge pipe, and operated in exact accordance with the prior patent to Goldie, 707,840.

13. Even if petitioners discharged compressed air into the upper part of the chamber *and* into the bend of the discharge pipe, they would be using the apparatus and method of the *expired* patents No. 671,303 to Warren (End of this Brief), No. 267,318 to Beach (R. 305 and No. 747,396 to Farnham (End of this Brief), and not the McMichael patent.

14. Respondent's apparatus operates precisely as does all the devices of the prior art, and all these devices operate precisely the same in blowing granular materials (such as sand or wheat) and plastic or semi-liquid materials (such as concrete or grout). This is shown not only by the prior patents, but respondent's chief engineer,

Kirkland, stated that he alternately blew "screenings" (*i. e.* finely divided rock) and sand, and concrete with respondent's apparatus (Exhibit H, Jour. West. Socy. Engineers, pp. 334-5).

15. Prior use of the device of McMichael's patent was established by witnesses Artingstall (R.34-59 Fanning (R.112-125and Kirkland (R106-7 in connection with Exhibit H, being the "Journal of the Western Society of Engineers," dated May, 1918.

Specification of Assigned Errors.

The Court of Appeals for the Second Circuit erred on the following points:

1. Said Court erred entirely in holding the McMichael patent in suit to be valid:

1-a. Against the showing of the prior art, considered alone.

1-b. Against the showing of the prior art as it should have been applied in the light of the decision of your Honors in *Concrete Appliance Co.* v. *Gomery*, 269 U. S. 177.

1-c. Against the clear record showing of the invalidity of the McMichael patent by reason of the introduction of new matter into the application in 1911 and 1913.

2. In construing the *Concrete Appliance Co.* v. *Gomery* decision absolutely oppositely to its clear and plain import, and thereupon refusing to consider its bearing on the question of invalidity of the McMichael patent.

3. In holding that the *Concrete Appliance Co.* v. *Gomery* decision did not require the Court to reconsider

the validity of the McMichael patent over their decision in the *Ulen* suit (*Concrete Mixing & Conveying Co.* v. *Ulen Contracting Co.*, 12 Fed. [2] 929, 931) wherein (a) different prior art was relied on, (b) the defendant used a different apparatus, and (c) did not use "wet" or liquid concrete, to which material the *Concrete Appliance Co.* v. *Gomery* decision pertains, and which material petitioners used exclusively.

4. In refusing to correctly consider the prior art, which conclusively showed:

4-a. The pneumatic blowing of practically all kinds of fluent and mobile materials to be very old.

4-b. The pneumatic blowing of *concrete* to be old, and disclosing the use of *"liquid"* or *"wet"* concrete for that purpose.

4-c. Various kinds of materials can be pneumatically blown with practically any given device or apparatus.

4-d. The mechanism or apparatus for pneumatically blowing all kinds of materials had become well known (and fairly standardized) in all its main features, viz.:

1. The air tight chamber;
2. The delivery pipe (with a bend therein);
3. The compressed air supplying means of various forms, including

3-a. compressed air supplied into the top of the chamber only;

3-b. compressed air supplied into the delivery pipe only; or

3-c. a combination of 3-a and 3-b.

This left nothing for McMichael to invent, and he merely appropriated from the prior art.

5. In holding the McMichael patent a pioneer patent for blowing concrete, in the face of the prior art, and especially Smith patent, 122,498.

6. In not holding that McMichael was not the first inventor of any substantial or material part of a device or method for pneumatically blowing concrete or other fluent or mobile materials.

7. In not holding the McMichael patent to be invalid by reason of the introduction into the application (filed January 14, 1907), of new matter, mainly in the "amendments" of January 14, 1911, and March 29, 1913, constituting a great preponderance of the entire specification, and by said "amendments" of 1911 and 1913 *introducing into the specification for the first time the "slug" theory, on which all the litigation brought on the patent has been based.*

8. In not holding the McMichael apparatus to be inoperative in view of the evidence adduced on this point.

9. In not holding the McMichael patent to be invalid on the testimony of Kirkland, respondent's chief engineer, taken in connection with his statements made in the article in the "Journal of the Western Society of Engineers," on May 13, 1918, establishing that the device of McMichael's patent operated exactly as do those of the prior art (Exhibit H).

10. In not holding that the testimony of witnesses Artingstall (R. 34-59 and Fanning (R. 112-125 established invalidating prior use, especially in view of the statements made by Kirkland, respondent's chief engineer, in said Journal of the Western Society of Engineers in May, 1918.

11. In not holding the McMichael patent to be invalid

on each and every one of the grounds hereinbefore set forth.

12. In not holding that petitioners do not infringe the McMichael patent.

The Ulen Suit.

In the decision of the Circuit Court of Appeals herein "the Ulen suit" is referred to, and brief explanation concerning that suit appears to be necessary here. That was a suit brought by the plaintiff-respondent here, Pneumatic Concrete Mixing & Conveying Co. against Ulen Contracting Corporation and Shandaken Tunnel Corporation in the Southern District of New York. The defendants' device in the Ulen suit was entirely different from that of your petitioner, and there were materially different defenses in the two suits. In the Ulen suit, defendant's machine used "*dry*" concrete and did not use liquid or "wet" concrete, as did petitioner in the present suit; your petitioner having always used fluent or liquid concrete, in accordance with Smith Patent 122,497, and mechanism taken from Smith Patent 122,498 and other expired patents. Neither of these Smith patents was in evidence in the Ulen suit, nor was Beach Patent No. 267,318, as well as others. The facts that (1) the mechanism in the Ulen suit was different, that (2) they blew *dry* concrete and not *liquid* concrete, and that (3) the principal prior patents relied on here were not in evidence there, render that suit practically irrelevant and moot so far as the present suit is concerned. Your petitioners were not parties to nor in any wise connected with the Ulen suit.

The decision of the District Court in the Ulen suit is reported in 12 Fed. (2) 1929, and the *per curiam* affirmation thereof by the Court of Appeals for the Second Circuit is found in 12 Fed. (2) 931.

ARGUMENT.

Brief Preliminary Summary of Argument.

1. The patent in suit discloses nothing more than the old standard device for "blowing" granular and plastic materials.

2. The use of this device for "blowing" concrete was disclosed in expired Smith patent 122,498, and the use of liquid or "wet" concrete in Smith patent 122,497.

3. The use of an air tight chamber, a delivery pipe, and one or two compressed air pipes were old for "blowing" all kinds of materials.

4. McMichael is a mere appropriator from the prior art.

5. Respondent's commercial device embodies prior patents rather than the McMichael device.

6. Petitioner used only devices of expired prior patents.

7. "Slug" theory of McMichael patent, on which all the litigation was based, is non-existent.

8. In any event, it was first inserted in McMichael's specification four years after filing, and renders the patent invalid.

9. Invalidating prior use was established in this case.

10. Findings of fact in C. C. A. 9th Circuit of invalidating prior use "must be treated as unassailable." *Adams* v. *Gilliland*, 242 U. S. 350.

I. The Patent in Suit.

This McMichael patent pertains to the old and highly developed art of conveying granular and plastic materials by pneumatic propulsion. By amendment in the Patent Office, four years after filing, the application was limited to the pneumatic transportation of concrete (commonly called "blowing" concrete). As a matter of perspective, it should be borne in mind that means for "blowing" many diverse kinds of materials are shown in the prior patents, *and the "blowing" of concrete was previously well known* (Smith Patents 122,497 and 122,498 [R.297-304. That is, the Smith Patent 122,498 shows an air tight chamber or tank F, with a bent delivery pipe D, opening from the bottom thereof, and a compressed air supplying pipe *f* for putting pressure on the chamber to drive the liquid concrete through pipe D to a place of delivery. This apparatus is of the general type used for blowing *all* kinds of materials, and it is, therefore, a clear disclosure that concrete may be "blown" in exactly the same manner and with the same mechanism as grain, sand, ashes, and other materials.

The mechanism or apparatus of the McMichael patent comprises a cylindrical chamber 1, having a conical bottom portion, and a lid 5 through which the material is introduced into the chamber 1. There is a discharge or delivery pipe 13, extending a short distance downwardly vertically from the bottom of chamber 1, the pipe having a bend and extending thence horizontally, and through this pipe the concrete or other mobile material is "blown" or conveyed away. The compressed air is introduced through a pipe 8 into the upper part of the chamber 1 and supplies air pressure upon the surface of the concrete or other material within the chamber, and a second

compressed air pipe 10 also discharges compressed air *into the material within the lower part of the chamber.* On this point, the specification as filed (R.284 lines 60-63) states:

> "10 is an air pipe controlled by a valve 11, and also leading air into the chamber, the delivery end of said pipe being at or near to the discharge or lower end of the hopper 2."

The *function* of this *second* stream of compressed air from pipe 10 is described in the *original* specification (R. 285 lines 21-24) as follows:

> "To loosen the material at the lower end of the hopper, and to assist its movement, I provide the additional air pipe adapted to discharge air in and through the material."

(The term "hopper" refers to the lower conical part of the chamber 1.)

That is all the disclosure concerning this second compressed air pipe there was in the McMichael application *as filed.* A very different function and principle of operation were described therefor *in the new matter illegally introduced into this application on January 24, 1911, and March 29, 1913,* as will be later hereinafter described.

The operation of "blowing" or transporting concrete, or other material, through the delivery pipe 13 is briefly described in McMichael's *original* specification as follows (R.284 lines 82-98):

> "The instant the air is turned into the chamber the door for the closure will be finally held in closed position by the air pressure. Owing to the pressure in the receiver, the material in the hopper will be forced downward and directed into the conveying tube, being carried along by the latter until

> it is finally discharged at 15. Owing to the provision of the U-shaped bend in the conveying tube immediately after leaving the hopper, the material will be more or less tightly packed as it is directed therethrough."

That is, the operation of this mechanism, as originally described, is just like that of any other blower.

In brief, the concrete is placed in chamber 1, compressed air from pipe 8 puts pressure on the top surface of the concrete and pushes some of it into and along delivery pipe 13, the air from pipe 10 serving (R.285 lines 21, 24) "to loosen the material at the lower end of the hopper (*i. e.*, within the chamber 1) and to assist in its movement." That is, all the elaborate process of cutting off "slugs" or cylinders of concrete, and of mixing the concrete in the delivery pipe were first introduced into the application in 1911.

II. (a) An air-tight chamber, with (b) a bent delivery pipe and (c-1) one, or (c-2) two, compressed air pipes, was in general use for "blowing" all kinds of materials long prior to McMichael.

II-a. McMichael not a pioneer inventor, but merely an appropriator of prior inventions.

We will show hereinafter from the prior art that long prior to McMichael the "blowing" of all kinds of granular, plastic and other fluent and mobile materials was well known, as was also the fact that a particular device would "blow" or convey successfully many different kinds of materials; and also that the mechanism for "blowing" all kinds of materials had become practically

standardized. McMichael was merely an appropriator, a mere follower of earlier inventors in these three respects, namely:

(a) the form and structure of his apparatus,

(b) the principle and method of its operation, and

(c) the material or materials operated upon.

In fact, we will show that McMichael's only change from prior patents is in having the second compressed air pipe 10 discharge the compressed air *into the material within the chamber 1* instead of discharging directly into the bend of the delivery pipe. This latter form had become standard in the art prior to McMichael (see Beach, Farnham, Warren and Goldie patents) and *is employed by respondent in its commercial machines.* This one feature of difference in the McMichael patent (*i. e.*, discharging a second stream of compressed air *into the material within the bottom part of the chamber*), neither petitioner nor respondent used in their commercial devices.

II-b. State of the Prior Art.

The following fundamentals of the art were long known and successfully practiced prior to the filing of McMichael's application for patent:

1. The application of pneumatic "blowing" to all kinds of liquid, particulate, or other fluent materials was well known, such as sand, concrete, grain, grout (which is practically one form of concrete), ashes, mail-matter, as well as others (see Smith, Beach, Farnham, Warren and Goldie patents, discussed later herein).

2. A certain type of apparatus had become practically

standard long prior to the filing of McMichael's application. That apparatus comprised

(1) a chamber to receive the material to be blown,

(2) a delivery pipe through which it is pneumatically conveyed away, and either

(3-a) one or (3-b) two compressed air pipes, *as might be selected or preferred by the particular inventor or designer,* for supplying the air to convey the materials into and through the delivery pipe to the place of delivery (see said prior patents, discussed later herein).

In all the prior patents wherein one compressed air pipe is used, the air is introduced either (1) into the chamber above the material to be blown, *or* (2) into the bend of the delivery pipe. In some patents two pipes, arranged as described, are used. McMichael is the only one to introduce a second stream of compressed air *into the material within the bottom part of the chamber,* and *that is his sole departure from mere appropriation of the prior art structure and practice.*

II-b-1. Consideration of Particular Prior Patents.

Patent No. 122,497 and No. 122,498 to Smith, dated January 2, 1872.

Patent 122,498 is a most notable contribution to this art, as *it discloses the main essentials of the machine for, and method of, pneumatically blowing concrete as practiced today.* It shows also a power machine for mixing concrete, but that is not involved here. In fact, it also shows the structure and method of making concrete roadways and other structures practically in accordance with the standard engineering practice of today, and there has

been little to add to the art since. The disclosure is notably complete and practical.

Patent 122,498 states (R.302-304as follows:

> "A distinctive feature in my method of laying pavements consists in manufacturing the *concrete composition in a fluid or semi-fluid state, so that it will flow through pipes*, and in conveying it from the mixing machine *to the spot where it is to be laid, in pipes or conduits* and flowing it from the pipes upon the ground, or upon a suitable foundation, where it immediately sets and forms the pavement, its surface being molded to any desired conformation by means of surface molds.
>
> "In thus constructing pavement I preferably use the composition described in an application for Letters Patent of the United States filed by me contemporaneously herewith; but in my improved process or method of laying pavements as herein described, I do not confine myself to that particular composition, but propose to use any composition whatever, now known or hereafter to be discovered, the *properties of which adapt it to be conveyed and laid while in a fluid state.*
>
> . . . . . .
>
> "The machine is provided with a rotary mixing-vessel, C, with a crane or other suitable hoisting apparatus, B, which dumps the materials into the mixing-vessel, with a series of grinding and mixing disks, and wheels M N working within the mixing-vessel, with adjustable and movable pipes or conduits D, through which the *liquid concrete composition* is conveyed from the machine to the street; and *also, if preferred, with forcing apparatus F, which forces the fluid into and through the pipes to its destination.*
>
> . . . . . .
>
> "The liquid composition, after it has been thoroughly mixed with the *pebbles, gravel, or*

broken stone, flows off from the mixer through passages *d*, provided with suitable valves, into the pipe D, which delivers it wherever it is required for use. *When it is necessary to force the* LIQUID UP HILL, *or to convey it quickly or in larger quantities than usual,* or THROUGH LONG PIPES, or *to press it in the mold* and expel the air therein, in which it might begin to stiffen before reaching its destination, I employ a forcing apparatus to propel it through the pipes, the same consisting, preferably, of a tight *chamber, F, capable of resisting great pressure,* into which the liquid flows from the mixer, and a pipe, *f*, by which *steam* or COMPRESSED AIR can be introduced into the chamber F, upon the LIQUID, to force the *latter, by pressure, into the pipe D. Any other species of forcing apparatus may, however, be substituted, if preferred.*

* * * * * * *

"By reference to my application for Letters Patent upon the composition which I prefer to employ with this machine, it will be observed that the constituent elements of such composition are *cement, sand, water, and gravel,* or *broken stones.* In preparing such composition I place the cement and sand in the mixer, in suitable proportions, and add the water and the *broken stones,* the apparatus being either in motion or not, as preferred. If not in motion I start it up and run it till the cement and water have become *liquid,* and the sand and broken stones thoroughly and uniformly mixed therewith. I then open the valves and let it flow off through the pipe D. New materials may be continuously fed to the machine while it is in operation, or the mixing-vessel may be successively filled and emptied, as the manufacturer may prefer."

In his companion *Patent No. 122,497,* Smith describes and claims *the modern liquid or fluent concrete now in*

universal use, substantially as it is used in general practice today. In this patent he discloses completely the modern liquid or "wet" concrete. The patent states:

> "In an application filed by me contemporaneously herewith [that for patent 122,498] for Letters Patent of the United States I have described certain improved machinery and appliances for manufacturing and mixing *concretes for pavements, buildings,* and other purposes, conveying it from the machine to the place where it is to be laid or used, and suitably *laying or casting it in molds or* otherwise to the required form. By reference to the specification filed therewith it will appear that such apparatus is specially adapted to the manufacture and use of *a liquid or semi-liquid concrete composition which can be conveyed through pipes and cast in molds.* No concrete composition has ever been brought into public use for the purposes referred to which is capable of being thus manipulated; nor has it been deemed practicable to attempt to *invent a composition sufficiently liquid to flow freely through pipes and yet able to set quickly upon reaching its destination, so as to form in a very short time a solid mass of artificial stone.* Such a composition, however, I have discovered, and *have proved, by a thorough course of experiments and trials, its complete fitness for the purposes and the great practical utility of its application in the manner referred to.* So far, therefore, as relates to this division of the subject-matter contained in my several applications for Letters Patent, my invention consists in a composition prepared substantially as hereinafter described, so as to be capable of use in a fluid or semi-fluid condition, for the purposes specified.
>
> "I take any good hydraulic cement, preferably Portland cement, and sand, gravel, or some equivalent of sand or gravel, such as broken shells, slag,

etc., and mix them together in about equal proportions by specific weight. This mixing may be accomplished by any suitable means, but preferably by the machine described in my other application above referred to. To the mixture *of cement and sand*, in the proportion of two parts, by weight, I add *three parts, by weight, of broken stone, using therefor any of the varieties of stone suitable for the purpose*, such as *blue-stone, quartz, the ordinary cobble-stones employed for paving purposes, granite, &c.* I then add a quantity of water equal to about three-fifths of the entire mass of materials already commingled, and agitate the mixture thoroughly by mechanical means until the whole is of a *fluid character, capable of flowing freely through pipes and of being run into covered molds.* It is then ready for use.

"It will be seen from what I have stated that the materials employed by me in making this improved composition are old, every one of them having been used for many years. My invention does not consist in being the first to combine such materials, but in being the first to combine them for the arts in such proportions that *a liquid or semi-liquid mass results which can be flowed through pipes* and run into covered molds, and which can be made and used *in laying pavements, building houses and other structures*, etc., *by means of the improved machinery described in my said accompanying application.*

"I do *not claim to cover a pasty mass* which can be pressed into blocks but *which will not flow through pipes*, the great practical advantage of my improvement being the adaptation of the material to a new method of conveying and laying it for the purposes set forth.

"The proportions above stated may be varied within certain limits without departing from the spirit of my invention. However they may be varied, *so long as the result is a composition which*

> *will flow through pipes or run into molds,* it comes within the scope of my claims. Indeed, with certain species of stone of different specific gravities, the proportions of sand, water, and cement must necessarily be slightly varied. The heavier the stone the more dense must be the surrounding liquid in order to sustain it. *The broken stone must be held uniformly diffused throughout the mass, and the liquid, while thin enough to flow even with the stones intermingled, must be thick enough or have tenacity enough to keep the stones from settling to the bottom."*

The claim of the patent reads:

> "The paving or building composition herein described, when prepared for use in a liquid or semi-liquid condition, capable of flowing in pipes and running into molds, substantially as described."

We have quoted extensively from these two Smith patents because of their almost complete disclosure of the modern art of blowing "wet" or liquid concrete. *The Court of Appeals for the Second Circuit held that these patents have no bearing on the present case.* We submit that, in themselves, they are a substantially total anticipation of the McMichael patent except as to trivial details.

These Smith patents were not found by the Patent Office during the prosecution of the application for McMichael's patent.

Thus it will be seen that at this early date, Smith had made a complete disclosure of how to make liquid concrete, and of the apparatus and method for "blowing" it through pipes and depositing it into the molds or forms. Patent 122,497 teaches clearly that concrete may be made of a consistency at once fluent so as to be pneumatically blown through pipes and *yet sufficiently strong so as to*

maintain even large stones as a constituent of the concrete, just as is done in modern commercial practice. The reason why the "liquid" or "wet" concrete so fully disclosed and claimed in Smith 122,497 was in disuse for many years and then passed into almost universal use is fully explained in *Concrete Appliance Co.* v. *Gomery,* 291 Fed. 486, 489, as follows:

> "Moreover, a study of the proofs satisfies us that from the time concrete came into use there had been a struggle between the architects and designers, who, as a class, favored the use of dry concrete, which would not flow, and the contractors, who, for construction convenience, favored wet or mush concrete, which would flow, and therefore allow the use of distribution chutes, and that, as soon as the use of wet concrete became general, the art used the wet concrete chutes, which it could not use for the dry. In that regard, the proof was that:
>
> " 'The more reinforced concrete came into use, the more contractors used wet concrete, and I should say that from 1908 on very much the greater portion of construction work was done in concrete than before; hence, also, the more wet concrete was used since that time.'
>
> "In these evolutionary stages of the concrete art, the proof is that the builders of grain elevators took a leading part in the use and distribution of wet or mush concrete."

On this point also, in this same case on appeal, *Concrete Appliance Co.* v. *Gomery,* 269 U. S. 177, 182, your Honors held:

> "Before 1904-5 it was common practice for architects' specifications to require that concrete used in building operations be mixed *'dry'*; that is, of a consistency which would not admit of its ready

> flow by gravity. This practice was resisted by engineers and contractors, because it was cheaper and easier to use 'wet' concrete, which could be conveniently distributed through chutes and conduits. For reasons which need not now be inquired into in detail, the increasing use in earlier years of 'wet' concrete in all types of structural work *had become the established practice by 1905.* Contemporaneously with this increasing use, and, as the proofs show, an active agency in inducing it, was the practical adaptation of the apparatus, used in moving and distributing grain and other substances of similar mobility, to all the requirements for the convenient handling and distribution of concrete by gravity in building operations."

The only substantial improvement which has since been made in the apparatus shown in Fig. 4 of Smith, 122,498, has been the introduction of a second pipe which discharges compressed air *directly into the bend of the delivery pipe D, and blowing in the direction of discharge of the material* through the pipe. This feature is shown in the prior patents to Beach, 267,318, Farnham, 347,396, Warren, 671,303 and Goldie, 707,840, discussed later herein. The only other change, or minor improvement which has been made over Fig. 4 of Smith, 122,498, is sloping and contracting the bottom of the chamber, *and that is shown in the Beach and Warren patents.* McMichael simply appropriated the sloping bottom from them. In respondent's *commercial* machine, it has also appropriated the old feature of having the second compressed air pipe discharge directly into the bend of the delivery pipe (Ulen Record, Exhibit D, pp. 184, 194). As to the narrowed or "hopper bottom" Judge BOURQUIN held, 23 Fed. (2) 131, 133:

> "* * * containers with hopper bottoms to direct the flow of their contents preceded McMichael for time so long, the memory of man runneth not to the contrary."

Selecting two old features from two prior patents, is no more an invention than selecting one feature from one patent. Selection and appropriation are not invention, even if repeated.

Attention is exemplarily directed to four prior patents, as follows:

Patent No. 267,318 to Beach, dated November 14, 1882 (R. 305).

Beach states the general objects of his invention (R. 396, lines 8-19) as follows:

> "My invention relates to pneumatic transportation; and the objects of my improvement are to provide a continuous current of air passing through a tube, pipe, or box at great velocity, into which current of moving air the article or matter to be transported or conveyed is, in limited quantities, continuously projected or impelled, and also to transmit such article or matter through the tube while in a state of suspension in the air in the tube, and without contact with the sides or bottom of the tube."

It will be noted that Beach has the chamber E to hold any one of a variety of fluent or mobile materials, and the chamber has an inwardly and downwardly-curved bottom. Compressed air is supplied from the chamber A, which may have (R.306 lines 33-35)

> "* * * air condensed to any degree of elasticity required and kept at a constant equal pressure."

The compressed air is directed through pipe B on to the top of the material in the air-tight chamber E. Air is also blown from the air supply tank A through the pipe G, *into the bend of the delivery pipe H*, and in the direction of the flow of the material (R.306 lines 36-38) which stated as follows:

> "G is a pipe, tube or box, an open end of which is inserted in the reservoir A so as to receive the air from the reservoir."

The material is blown into the receiver K which "will be placed at a point of considerable elevation above the surface of the earth" (R.307, lines 73-74). In Claim 1 of this patent the mechanism is described as transporting "mail-matter, flour, grain or other articles to be transported."

The Beach patent discloses, in addition to the structure of Smith, 122,498, the blowing of the second stream of compressed air into the bend of the delivery pipe in the direction of conveyance of that pipe and discloses the application of pneumatic "blowing" to a wide variety of materials. To add to the device of Fig. 4 of Smith, 122,498, a second compressed pipe, discharging into the bend of his delivery pipe D, would be a mere matter of entirely obvious mechanical change, in the light of the Beach patent. This is likewise true with respect to the Farnham, Warren and Goldie patents now to be described. This Beach patent also shows the inward and downward contraction of the bottom of the chamber toward the entrance to the delivery pipe previously referred to herein. If any point should be made by opposing counsel of the presence of valves in the delivery pipes of Beach, it may be noted that a gate valve such as is

shown but not numbered in Smith, 122,498, leaves the pipe entirely unobstructed when open, and is common practice.

Patent No. 747,396 to Farnham, dated December 22, 1903 (End of this Brief).

This patent shows a receiving chamber 1, the delivery pipe 2, 6, a compressed air pipe 7 for introducing the compressed air within the chamber *on top* of the material, and another compressed air pipe 7 directing a second stream of compressed air *into the bend of the delivery pipe.* This patent is described as being applied to the conveyance of sand, but the teaching as to the conveyance of all kinds of liquid and fluent materials, including liquid or fluent concrete, had already been fully taught in the prior patents to Smith and Beach. *The Farnham patent is another example in the prior art teaching the advantage of introducing the second stream of compressed air into the bend of the delivery pipe and in the direction of travel of the blown materials.* Farnham states (p. 1, lines 83-89), that the top air stream may be cut off and both streams may be varied.

Patent No. 671,303 to Warren, dated April 2, 1901 (End of this Brief).

This patent is for a device for blowing sand, and has the chamber A with the bottom part of conically downwardly inclined shape. The compressed air is directed onto the top of the material in the chamber A through a pipe J, and is directed into the bend of the delivery pipe M. It is true that the delivery pipe in Warren would be changed in shape and dimensions for blowing concrete, substantially into that shown in Smith, 122,498, but one of the main bearings of the Warren patent is

in teaching the advantage of introducing a second stream of compressed air into the bend of the delivery pipe and in the direction of flow of the blown materials. The addition of a second stream of compressed air into the bend of the pipe D in the device of Smith's patent, 122,498, in view of the teachings of the Beach, Farnham and Warren patents, would be a simple matter of selection from the known prior art. This Warren patent also discloses the conical or hopper like bottom portion of the chamber. There is no point to the objection, made in the opinion of the Court of Appeals of the Second Circuit, that the delivery pipes of some of these patented devices are of relatively small diameter. That is merely an obvious feature of design, and is not invention. On that point, the McMichael patent states (R. 375, lines 113-122) that "the engineer will readily understand what the relative proportion of the parts should be."

Patent No. 707,840 to Goldie, dated August 26, 1902 (End of this Brief).

This patent shows a device for blowing cement, although obviously it could be used for concrete in the light of the teachings of Smith's patents, 122,497 and 122,498. This patent has the downwardly-inclined conical chamber 16 and a delivery pipe 13. Compressed air is introduced through the pipe 17 into the bend of the delivery pipe 13. A jet of water may be introduced through the pipe 20 if desired.

In this Goldie patent, it is taught that in mechanism for pneumatically blowing materials, *the introduction of compressed air on top of the materials in the chamber 16 is not necessary*, but that with mobile or fluent materials, such as the cement, sand and gravel referred to

(p. 3, lines 6-9) the operation can be successfully performed by blowing a single stream of compressed air or steam into the bend of the delivery pipe 13 in the direction of conveyance of the material. While Goldie shows only a short pipe, he uses high pressure to drive the material into the interstices of the ballast, and that pressure would drive it through a long pipe. The length of pipe through which the material is blown is merely a question of intensity of air pressure.

It is true that the Goldie patent does not describe the "blowing" of concrete by his device, but to blow concrete through the Goldie device in view of the two Smith patents 122,497 and 122,498, would be merely a change of materials, for which there is full instruction in the prior art as previously set forth. Goldie's prior patent 676,128, mentioned on the first page of this patent, describes the use of liquid cement (Goldie, 707,840, p. 1, lines 40-53), for the same purpose. It will be noted that on page 3, beginning line 6, Goldie describes the blowing of *cement mixed with sand or gravel*, which with water are the constituents of concrete. In this paragraph he describes blowing water in through the pipe 20 *to mix all the ingredients in the delivery pipe*. This is identically the same process as that described in the patent in suit (R. 285, 286) and discussed quite fully elsewhere herein.

The remaining patents need not be discussed in detail. The McIlvrid patent 958,421 shows a tank 1 with a delivery pipe 16 and one compressed air pipe 13, and has the improvement of a mechanical stirrer within the tank. This machine is for blowing grout, which contains water, sand, cement, and often gravel and small stones (R. 325, lines 8-14). This patent also disclosed the idea of simultaneous mixing and blowing, and issued one year before that

theory was inserted in the McMichael application as new matter. To make the pipes larger to transport larger stones is certainly not invention. All the remaining prior patents are supporting and corroborative of all we have said concerning the prior art and need not be referred to in further detail, but their bearing will be understood from the foregoing argument.

Application of the Foregoing Prior Art to McMichael's Patent.

From the consideration of the foregoing prior art, it will be clear therefrom that prior to McMichael:

1. The pneumatic "blowing" of all kinds of liquid, particulate and other fluent or mobile materials was old and well-known (shown by all the prior art).

2. "Blowing" any of said materials by an apparatus comprising a chamber having a downwardly inclined bottom portion, and discharging into a delivery pipe was likewise old (shown by all the prior art).

3. It was old to apply compressed air in any one of three ways to "blow" the material, as follows:

3-a. By introducing the compressed air *only* on top of the material within the chamber (Smith, 122,498);

3-b. By introducing the compressed air on top of the material within the chamber *and* introducing a second stream of compressed air into the bend of the delivery pipe in the direction of travel of the material (Beach, Farnham and Warren);

3-c. Using only the bottom stream of compressed air introduced into the bend of the delivery pipe and in the

direction of the flow of the material, there being no compressed air introduced directly into the chamber (Goldie).

McMichael's patent is merely a copy of, or a selection from, the prior patents. These had become practically standard and were common property. Obviously, McMichael cannot have a valid patent for this old and well-known structure, and it is likewise quite clear from the record that petitioners-defendants do not use anything more than, or different from, this old and common standard type *which is free to all.*

This judgment of invalidity is made legally necessary on any one of several separate grounds, to wit:

1. The McMichael patent is invalid in view of the Smith patents 122,498 and 122,497 (R.297-304

2. The McMichael patent is invalid in view of the Smith patents and the disclosure in the other patents, such as Beach, 267,318; Farnham, 747,396, or Warren, 671,303, of introducing a second stream of compressed air into the apparatus generally.

3. The McMichael patent is invalid in view of the Farnham patent, or the Beach patent, or the Warren patent, and the teachings of all the prior patents, that any kind of fluent or mobile material, including liquid concrete, can be blown pneumatically in a standard mechanism of this general type.

4. In other words, McMichael has simply taken the disclosure of the Smith patents, that liquid concrete could be placed in an air-tight chamber having a bottom delivery pipe, and having a compressed air supplying pipe so as to put pressure on the top of the material in the chamber to blow it pneumatically through the delivery pipe to a place of delivery. He utilized a second com-

pressed air supplying pipe as disclosed in the patents as Beach, Farnham, Warren and Goldie, which had already shown that a second compressed air stream might be used if desired. *And that is all that McMichael has actually done.*

III. Respondent Does Not Use the Mechanism of Their Own Patent.

The commercial form of respondent's device is shown in the record in the *Ulen* suit, pages 184 and 194 "Plaintiff's Exhibit No. 5" and "Defendant's Exhibit B." It is not constructed according to the McMichael patent, but in accordance with the prior art, *as the second compressed air pipe is introduced into the bend of the delivery pipe.* In that mechanism, Defendant's Exhibit E, the receiver A communicates with the delivery pipe D, the compressed air is admitted on top of the material in the chamber A through the pipe E, and two streams of compressed air are supplied through pipes F and H *into the bend C of the delivery pipe.* On page 184 there is one compressed air pipe B discharging *into the bend of the delivery pipe.* It will be clear from consideration of this drawing that respondent has abandoned in its commercial machines the form of device shown in its patent, and is using a device having the essential structure of the Beach, Farnham and Warren patents, only modified somewhat in shape. It might be also validly considered that respondent has merely taken the device of the Smith patent, 122,498, and added thereto a second stream of compressed air at the bend of the delivery pipe, as taught in the Beach, Warren, Farnham and Goldie patents.

If McMichael's air pipe 10 discharging air *within* the chamber is an improvement over the prior art, why does

not respondent use it in its commercial machine? It is the only feature peculiar to McMichael over the prior patents. In any event, commercially, respondent is using the prior art devices (Ulen R., Exhibit D, pp. 184, 194) and not the patent in suit.

IV. *The Concrete Appliances Company* v. *Gomery* Decision.

The decision in *Concrete Appliances Company* v. *Gomery*, 269 U. S. 177, we submit, is the governing law of this Court in this case. The chief bearing of this decision on the present case is that it lays down the principle that in the art of conveying liquid, or particulate, or other fluent or mobile materials of all kinds, *any* devices previously employed to convey *any* of these materials will be obviously applicable to convey *some other kind of said materials*, and such extended use is a mere matter of selction, and does not amount to invention. We quote from that decision as follows:

> "It is a fact of which we may take judicial notice (King *v.* Gallun, 109 U. S. 99, 3 S. Ct. 85, 27 L. Ed. 870) that the principle of conveying and distributing a mobile substance by gravity has found exemplification for centuries, in apparatus for lifting water by power, in buckets or other convenient form of conveyor to a central reservoir from which its flow is induced by gravity, *through* suitable *conduits* to fixed points or through *movable pipes* or hose to *varying selected points*. Long prior to the Callahan application the principle had been applied to other substances capable of flow under the action of gravity, *such as grain, coal, crushed stone, sand, and iron ore.*
>
> * * * * * * *

"In this state of the art, Callahan and several others, in the period 1909, applied for patents on combinations for the conveying of wet concrete through spouts or chutes; their applications resulting in interferences.

"Without more extensive examination of the record, this state of the proof leads us irresistibly to the conclusion that the combination described in the Callahan application does not constitute an invention.

"The observations of common experience in the mechanical arts would lead one to expect that, once *the feasibility of using 'wet' concrete in building operations was established, the mechanical skill of those familiar with engineering and building problems would seek to make use of known methods and appliances for the convenient handling of this new building material.*

"To say nothing of the universally known methods and appliances for raising and distributing water, there were ready at hand widely used and generally understood appliances for the *elevation and distribution of mobile substances*, such as *grain* and *coal*, which involved, both in principle and in practical detail, all the elements described in the Callahan claims. *Failure to make use of these obviously applicable methods and appliances in combination, suitable to the particular work in hand, in dealing with a new, plastic material capable of similar treatment, would, we think, have evidenced a want of ordinary mechanical skill and of familiarity with construction problems and methods.* The adaptation independently made by engineers and builders of these familiar appliances to the movement and distribution of concrete cement in building operations and the independent patent applications, within a comparatively short space of time, for devices for that purpose are in them-

selves persuasive evidence that this use, in combination of well known mechanical elements was the *product only of ordinary mechanical or engineering skill and not of inventive genius.* Atlantic Works *v.* Brady, 107 U. S. 192, 2 S. Ct. 225, 27 L. Ed. 438. It is but 'the suggestion of that common experience, which arose spontaneously and by a necessity of human reasoning, in the minds of those who had become acquainted with the circumstances with which they had to deal.' Hollister *v.* Benedict Manufacturing Co., 113 U. S. 59, 72, 5 S. Ct. 717, 724 (28 L. Ed. 901). *This progressive adaptation, much of which preceded and some of which was contemporaneous with the Callahan adaptation, of well-known devices to new but similar uses, 'is but the display of the expected skill of the calling, and involves only the exercise of the ordinary faculties of reasoning upon the materials supplied by a special knowledge, and the facility of manipulation which results from its habitual and intelligent practice.'* Hollister *v.* Benedict Manufacturing Co., *supra*, at page 73 (5 S. Ct. 724). *No novel elements were used by Callahan in his device.* We are unable to find that their use in combination in it was more than the application to them of mechanical skill in the course of a natural development and expansion of the art." (Italics ours.)

In view of this decision, all of the prior patents discussed, each considered by itself, is analogous and relevant prior art with respect to the McMichael patent. In other words, we have shown that, beginning with the Smith patent 122,498, the prior art, considered by itself in its successive and simple development, discloses and teaches everything *of substance* disclosed in the McMichael patent and warrants invalidation of that patent. Any of these patents which discloses the chamber, the de-

livery pipe and the two compressed air pipes, when considered by itself, is an anticipation of the McMichael patent.

V. Petitioner-Defendant's Device and Practice.

Defendant's device is shown at page 382, Record, Plaintiff's Exhibit No. 4, and comprises the chamber without reference character, and has a compressed air pipe 24 delivering a stream of compressed air into the bend of the delivery pipe P. There is also a compressed air pipe 27 adapted to deliver compressed air into the upper part of the chamber, *but which was not used by petitioner.* Plaintiff's Exhibit No. 5 (R.294 is an outline drawing of a portion of the same mechanism, showing the threaded opening for connecting the compressed air pipe in the bend of the delivery pipe, to introduce a stream of compressed air at that point blowing in the direction of travel of the material.

As built and originally installed, petitioner-defendant's device had the pipe 27 by which compressed air could be blown into the chamber on top of the concrete or other material therewithin, in addition to the pipe 24 to blow compressed air into the bend of the delivery pipe P. As a matter of fact, in actual practice, after the first few days of experimentation with the device, petitioner never used the top air, as it was found that with liquid or fluent concrete the top air was not only unnecessary but was actually detrimental. In either condition it is merely an utilization of the devices of the prior patents.

The facts concerning the operation of petitioners-defendants' machine are clear from the record. See R. 201-207, 230-1, 245-6 for testimony of Kennedy, Swartz and Dyer.

It is clear from this testimony of these three witnesses that defendant's device was operated in all actual work by using only the bottom pipe to blow compressed air only into the bend of the delivery pipe, and no air was blown into the chamber on top of the material. That is, defendants-petitioners' device operated substantially the same as Goldie patent 707,840.

We submit that it is proven by preponderance of the evidence that defendants' petitioners did not use the top air; we submit that this question is neither determinative nor important in the present case. It is clear that *whether or not petitioners-defendants used the top air, in either case they were but using the standard devices of the prior art which were free to all,* whether these devices be considered simply in the light of the continuous development of the art, or whether they be considered in the light of the decision of this Court in *Concrete Appliances Co.* v. *Gomery,* 269 U. S. 177.

Even considering the top air as being used, petitioners-respondents are merely using the device of Beach patent 267,318, Farnham patent 347,396 or Warren patent 671,303, with some slight changes in the proportion of the pipes. Furthermore, petitioners-defendants utilize the method of blowing *liquid concrete* disclosed in Smith's patent 122,498 and the general mechanism of Smith 122,498, namely, the container F, the delivery pipe D, and the top compressed air pipe *f* of Smith, and added thereto a second compressed air pipe blowing *into the bend of the delivery pipe and in the direction of travel of the material in that pipe,* as is taught by Beach, Farnham and Warren, *and which is not disclosed in the McMichael* patent. It is clear, therefore, that even when and if petitioners-defendants used the top air in addition

to the compressed air entering the bend of the delivery pipe, they were merely using the devices of the prior art which are free to all. When petitioners-defendants' device was operated in this manner, that is, with the upper compressed air supply cut off, its structure and manner of operation were practically identical with that of the Goldie patent, 707,840, which has the conically downwardly-decreasing chamber 16, the delivery pipe 13, and the compressed air pipe 17 delivering a single stream of compressed air into the bend of the delivery pipe and in the direction of travel of the material.

VI. The "Slug" Theory of the McMichael Patent.

In all the litigation which has been based on this patent, the *Ulen* suit in 1923, this present suit, and that brought in the Western District of the State of Washington, the plaintiffs-respondents have relied upon the so-called "slug" operation of the McMichael patent. This theory was first introduced into the application for that patent by amendment on January 24, 1911 (Ulen Record, Exhibit D, pp. 219-226), and is not even remotely suggested in the application as filed. It is to the effect that in the McMichael patent the concrete is not blown through the pipe by the *current* of compressed air, but that concrete is used which is "relatively compact and impervious to air" (R. 285, lines 62, 63). This "dry" concrete forms into air-impervious slugs or cylinders, with which no air is intermixed, but the total air pressure is on the back end of these successive integral slugs or cylinders of concrete, and pushes them along through the pipe by this back pressure (Ulen Record, Exhibit D, p. 49, fol. 145; p. 50, fols. 148-9; p. 127, fol. 381; pp. 128, 129).

From a study of the cited passages from the Ulen record, it will be clear that the entire case of plaintiffs was based on this slug theory, *i. e.*, that the air pipe 10 by "powerful jets" cut off slugs or cylinders of concrete, and these were blown integrally through the delivery pipe.

This imaginary cutting off and propulsion of imaginary "slugs" or segments, was pronounced by the district court to be "invention of a high order." *Vide* 12 Fed. (2) 931, as follows:

> "The appreciation by the inventor of the necessity of limiting the concrete to be conveyed to sections of moderate size and weight, and *his method by the second air jet of securing the cutting off of a segment from the mass of concrete and a propulsion of this segment through the discharge pipe*, involves invention of a high order."

That is, the *Ulen* suit was won on the imaginary and impossible "slug" theory. The Court of Appeals for the Second Circuit affirmed without opinion. 12 Fed. (2) 931. The suit was won on this impossible "method," *not mentioned in the specification as filed, but introduced four years later, as an entirely foreign inventive principle*, and rendering the patent invalid by reason of this "new matter."

This theory is remarkable in various respects. It is remarkable for its originality, for its impossibility, its manifest inoperativeness, and the *total absence of any disclosure of it from the McMichael application as filed on January 14, 1907*. This "slug" theory was first introduced into the application (Ulen Record, Exhibit D, pp. 196, 283) by amendment D filed on January 24, 1911 (four years after the McMichael application had been filed) and further elaborated by amendment F, filed on March 29,

1913. The new matter inserted by these two amendments comprises the greater part of the specification, *i. e.*, almost all of the matter on pages R.285 R.286 and the remainder of the specification on R 287.

An example of the statements introduced into the McMichael application in 1911 and 1913, as to the merits of the imaginary "slug" operation (R.285 lines 73-80) is as follows:

> "This action (*i. e.*, the slug making action) of the two air bodies in my apparatus is to be contrasted with the action of air in earlier devices which are so constructed that light materials such as grain or ashes could be caught in large moving air bodies and carried along in suspension with each particle separated from the others."

Judge BOURQUIN in his decision in the suit in the Western District of Washington (23 Fed. [2] 131, 133), after giving more careful consideration to this "slug" theory, said:

> "Adverting to the third of plaintiff's contentions, the first observation is that the slug theory is not proven and is untenable. With 100 pounds of air from the primary upper air pipe behind it, *the concrete stands not on the order of its going, but goes at once*, and through the discharge pipe 'with great rapidity and speed.' *In these circumstances, the upper air does not halt until the lower air has neatly cut off and removed a slug of concrete, nor does the lower air, of like pressure from the common reservoir, halt until within the field of its activity has been projected sufficient concrete to form any slug.*
>
> "In the nature of things, the patent now stipulating what the application originally did not, viz.: simultaneous and constant application of both up-

per and lower air, the lower air can but some disintegrate and aerate the mass of concrete as it rushes by, and thereby lubricate, lighten, and assist its flow through the conduit. The lower air but joins and flows in the same direction and with the stream of concrete. It may be that, if the upper and lower air were alternately applied, some quasi slug action would follow, akin to the action of Sounders' 'air-lift pump,' patent 597,023 of 1896, *but not when simultaneously applied as here.*

"Taking McMichael as it is, *to expect or secure movement of the concrete in alternate slugs of concrete and air would do violence to the laws of nature and confound reason. It cannot be done.* Moreover, the proof is clear, by plaintiff's witness as by defendant's, and some who are interested in plaintiff, that the concrete discharges in a continuous aerated or mixed stream of concrete and air, and not at all in any slug formation."

In other words, it is preponderantly clear that McMichael's device operates the same as does *all* those of the prior art. It is, therefore, invalid in view of the prior patents.

To harmonize with this complete shifting of ground by Amendment D, filed January 24, 1911, other significant changes in the specification as originally filed were made. The statement of invention in the preamble of the specification, as originally filed (Ulen Record, Exhibit D, p. 199), reads as follows:

"This invention relates to apparatus for *elevating* and transporting *granular and plastic building material, such as sand, plaster, mortar and concrete.*

"The invention has for its object to provide an apparatus for elevating and transporting material of the character mentioned in a more expeditious

manner and with greater facility than is possible by the employ of ordinary methods."

(The words in italics in the just quoted passage were *cancelled* by amendment B, filed January 24, 1911.)

By that amendment, and later amendments, this statement of invention was changed (R. 284 to read as follows:

"This invention relates to A METHOD OF AND an apparatus for transporting AND TREATING concrete.

"The invention has for its object to provide A METHOD OF AND AN apparatus for elevating and transporting material of the character mentioned in a more expeditious manner and with greater facility than is possible by the employment of ordinary methods AND MECHANISMS."

(The words in caps were INSERTED by these amendments.)

It will be noted that in the application as filed, McMichael stated that his device was adaptable for transporting "*granular and* plastic building material, such as *sand, plaster,* mortar *and* concrete."

In other words, McMichael's original statement of invention was absolutely in accord with (1) the disclosures and evidence of the prior art taken by itself, and (2) absolutely in accord with the decision of this Court in *Concrete Appliances Co.* v. *Gomery*, 269 U. S. 177. It is very clear that mechanism and methods for blowing concrete are equally and efficiently applicable to granular and plastic materials, and a device which will "blow" sand or wheat or ashes, will also "blow" concrete, and *vice versa.* These changes in McMichael's specification were made, apparently, in part at least, in an attempt to

escape from the devastating effects of the prior art. *It must be recalled in this connection that the Patent Office did not find the Smith patents 122,497 and 122,498, which are the closest prior art.*

In McMichael's application as filed, there is not one word of disclosure (1) as to the (imaginary) slug method of blowing concrete; but (2) a very clear disclosure that the "blowing" of concrete is the same both as to apparatus and method as other granular and plastic materials.

Testimony of Kirkland on This Point.

Another very illuminating feature, tending most persuasively to show that the McMichael apparatus operates like all the other devices of the prior art, whether for blowing concrete, grout, sand, grain, or what-not, is the testimony of plaintiff-respondent's chief engineer.

Mr. H. B. Kirkland became chief engineer of the respondent's corporation about 1913 (R.109-10, and from that time has had complete charge of the installation and of instruction of workmen in the operation of respondent's blowers (Ulen Record, Exhibit D, pp. 43, 45). In the next six years, due to his wide and exclusive experience with this machine, Mr. Kirkland became an authority as to the manner and principle of its operation.

On May 13, 1918, he delivered an address before the Western Society of Engineers, which was published in the Journal of that Society for May, 1918 (Defendant's Exhibit H), which was copyrighted in 1918, in which Mr. Kirkland described the operation of this machine (after six years exclusive experience in installing and operating the machine (R. 107-8)) as follows:

> "As the portions of the batch drop into the lower air stream, which has a velocity of about 5,000 feet

per minute, these portions are **carried along in suspension much as dust is carried along in a storm,** except that the particles are much closer together. Although the speed *of the air jet is very high, the speed of the concrete materials is much slower.* The speed of the concrete varies according to the amount of voids in the materials which permit the air to pass through. The air in passing through the voids tends to carry with it the smaller ingredients; that is, the sand tends to fill the voids between the rocks and the cement tends to fill the voids remaining, and as the voids become filled up with the smaller ingredients passing through, the speed of the mass increases, the pressure of the air behind the mass increases with the decrease of the voids in the mass, and the speed of the mass concrete increases.

"Now, in this explanation of the mixing process, I have assumed that the air velocity passing through the pipe **is sufficient to keep the materials in suspension, and it is important to have a sufficient air pressure to keep the materials in suspension,** because when the air velocity is reduced the *materials simply roll and tumble along the bottom of the pipe.* The concrete will also mix in this manner, but it is not conducive to good operation and makes a dirty pipe line, which is liable to become plugged. In shooting concrete, therefore, it will be found that with an 8-in. pipe and with materials of the specific gravity of limestone, the pressure should not fall below 50 pounds, *as the materials will then commence to drag along the pipe.* Any air expended below 25 pounds is wasted when blowing concrete through an 8-in. pipe" (R. pp.107-108

In other words, plaintiff-respondent's chief engineer stated to the Western Society of Engineers in May, 1918, that the McMichael device operates exactly like *all* the patents of the prior art.

In addition to this, in that same address, delivered on May 13, 1918, to the Western Society of Engineers, Mr. Kirkland stated that on the "Diana tunnel" job (Defendant's Exhibit H, pp. 334, 335), with one of plaintiff-respondent's machines, he *alternately blew concrete* into the form, and *blew limestone screenings* (which is in reality very small stones) *and sand* into the cavities between the concrete and the natural rock of the tunnel. His statement on this point is as follows:

> "At the north end of the tunnel the temporary timbering was removed as concrete progressed. Considerable breakage in the roof left cavities of various depths which it was necessary to fill either with concrete or some variety of packing. *Where packing was used it was placed with the [plaintiff's McMichael] pneumatic machine. The packing material consisted of a mixture of 75 per cent. limestone screenings and 25 per cent. sand. This was blown in* filling the cavity completely and packing it tightly so that the weight or any pressure from rock settlement was evenly distributed over the barrel of the arch through the packing."

When called as a witness by the defendants herein, (R. 105-110), he was asked to identify this article, and did so. He was then asked whether he wished to substantiate or repudiate the article. In view of the fact that his employer's entire case was hung on the "slug" theory of operation, Mr. Kirkland *repudiated his statements in the address as to the manner of operation of the McMichael mechanism* (R. 106-8), that is, that it operated kinetically like any other machine for blowing fluent, liquid or particulate materials, *because of the danger of such admission to his employer's case.* Mr. Kirkland is an educated and trained engineer and has had long experience

with the McMichael blower and his statement before the Society of Engineers was made before any suits were brought on the patent, and while he had no incentive to state anything other than the exact facts.

Mr. Kirkland, however, while repudiating the description of the *manner of operation* of plaintiff-respondent's machine, as made by him in the address to the Western Society of Engineers on May 13, 1918, *declined* to repudiate the *statement of the facts* that on the Diana tunnel job he at *one time blew concrete and immediately subsequently blew limestone screenings and sand* with one of defendant-respondent's own machines. Mr. Kirkland was sufficiently astute to appreciate the difference between what might be regarded as opinion evidence and fact evidence. In this case the fact evidence was more convincing and weighty and quite as significant as the opinion evidence.

All these various items of evidence are cumulative and corroborative to show that McMichael's device operates precisely as do those of the prior art, and that it is anticipated and invalidated thereby.

New Matter Illegally Inserted in the McMichael Patent.

Slug Theory of 1911 a Different "Invention."

The change made in 1911 in the statement of invention, eliminating the statement that McMichael's machine would blow either *granular or* plastic material, was concurrent with the introduction of the "slug" theory and that of mixing the concrete while being blown through the pipe. *This is an entirely different "invention" from that disclosed in the application as filed, and renders the patent invalid.*

This expansion of McMichael's application, and the unwarranted importation of Leake's inventive ideas thereinto in 1911 are well stated by Judge BOURQUIN at 23 Fed. (2) 131 and 132. This finding of fact by the District Judge was confirmed by the Court of Appeals at 27 Fed. (2) 839 to 841.

Practically all of pages 2, 3 and 4 of the specification of the printed patent (R. 285-287) constitute new matter inserted either on January 24, 1911 (after McMichael had had access to Leake's application) or on March 29, 1913, and relate to the new method of "treating" concrete, *i. e.*, the "slug" method, and also that of mixing the ingredients to make the concrete while in flight in the delivery pipe. It will be noted that the original specification, as filed, which is practically entirely on page 1 and the first eight lines of page 2 (R. 373), is *substantially of the same scope and subject-matter as the other patents of the prior art for blowing plastic and granular materials.*

There are two new methods and functions set forth in the new matter introduced into the specification partly on January 24, 1911, and the remainder on March 29, 1913, and printed copies of the patent are handed up herewith marked in red ink to indicate the dates and extents of these interjections of new matter, and marked in accordance with Amendment D of January 24, 1911, and Amendment F of March 29, 1913 (Ulen Record, Exhibit D, pp. 219-232 and 256-270).

The two new methods or functions are the "sub-mass" or "slug" theory and that of placing "concrete forming materials" in the chamber and effecting the mixing of the concrete during its flight through the discharge or delivery pipe 13. *There is no hint of either of these methods in the specification as filed.*

The Sub-Mass or "Slug" Theory.

This theory has been the head, front and cornerstone of all the litigation based on this patent. In the litigation it has been usually termed the "slug" theory. It is to the effect that the compressed air pipe 10 emits jets of compressed air and breaks off the concrete in the lower part of the chamber 1 into "sub-masses," and these are then propelled through the delivery pipe in integral "slugs" or cylinders (also called "sub-masses").

The first insertion setting forth this theory was made on January 24, 1911 (Ulen Record, Exhibit D, pages 219-222), and begins at page 2, lines 23-34 of the printed patent (R.285), where it is stated:

> "The lower air pipe 10 which extends to a point immediately adjacent the delivery pipe or discharge duct 13 serves the double function of preventing choking in the entrance to the delivery pipe and of supplying air under pressure *in sharp jets directly to the delivery pipe itself.*"

In that same amendment of January 24, 1911, the novel sub-mass theory, in combination with the concrete making or mixing theory, is further unfolded, beginning at line 80, page 2 (R.285) as follows:

> "• • • One of the strongly marked and novel matters incident to this provision of the pipe 10 for introducing air directly into the discharge pipe, whether considered by itself or considered as supplemental to the agency such as the air from pipe 8 tending to effect downward and forward propulsion of the entire mass, is this, that the rapidly moving air from pipe 10 *acts upon sub-masses successively of the general mass,* at points *near* those where they enter the delivery pipe, the result being that the *thorough commingling* of the ingredients

> (rock pieces, sand, cement and water) well understood by the engineer to be essential to a perfect concrete, can be attained with great rapidity and *with a perfect, uniform distribution of the various ingredients* as concerns the relative positions of all the component particles."

In simple language, this new matter states that the pipe 10 buried in the mass of concrete near the bottom of the chamber 1, emits the air in sharp jets (although there is absolutely no mechanism for effecting this jet action); that these jets pass directly into the pipe 13, and detach sub-masses from the mass of concrete, which is under continuous and equal pressure upon its entire surface, of relatively very great area, from the compressed air from pipe 8, and that this detachment of the sub-masses effects a *thorough and perfect mixing of the ingredients of the concrete*, and cuts it off into slugs or cylinders and pushes these integrally through the delivery pipe. No theory could be more preposterous. As a matter of fact, the air from the pipe 10 comes out *in a steady stream*, and *not* in "sharp jets," and discharges into the mass of concrete, which is already under equal or greater pressure on its surface from the pipe 8. This over-all pressure would prevent any detachment of sub-masses; but even if it were absent, all that the air from pipe 10 would do would be to blow a hole in the concrete in the direction of least resistance (R. 55 One thing is certain, it would not detach sub-masses nor would it cause a perfect mixing of the ingredients as asserted in the passage quoted. See Judge BOURQUIN's decision, quoted following. The soundness of his demolition of this theory will appeal to the common sense of any practical man.

On this point, the Court of Appeals for the Ninth Circuit held (27 Fed. 838, 841):

"*There was no suggestion of a slug theory in the original application of McMichael,* but when the patent was issued, more than eight years later, it was stated in the specifications that the lower air pipe adjacent to the discharge duct 'serves the double function of preventing choking in the entrance to the delivery pipe and of supplying air under pressure in sharp jets directly to the delivery pipe itself.'

"The slug theory was obviously adopted, from expressions found in Leake's application, in which he proposed the use of a combination consisting of two tanks discharging into a single conduit alternately, by means of which the main body of concrete 'can be detached in portions and blown into the conduit and driven along the same.' *Such a result might be accomplished by the use of his combination, but it is not apparent that any slug action occurs in the use of either the McMichael* or the Hackley combination. In neither is there *intermittent pressure, or 'sharp jets' of air, and in both there must necessarily be exerted a steady and continuous force from the upper and the lower air nozzles, combining to drive forward the concrete and deliver it in a practically unbroken stream,* and if, indeed, a temporary obstruction of material at the exit should occur, it is not believed that its release would result in a slug action, or a constantly intermittent propulsion of concrete, or that, if such an intermittent action could in practice be accomplished, any advantage would thereby be attained. The decided weight of the testimony is to the contrary."

On this point the District Judge held (23 Fed. 133-4):

"Adverting to the third of plaintiff's contentions, the first observation is that the slug theory is not proven and is untenable. With 100 pounds of air

from the primary upper air pipe behind it, *the concrete stands not on the order of its going, but goes at once*, and through the discharge pipe 'with great rapidity and speed.' *In these circumstances, the upper air does not halt until the lower air has neatly cut off and removed a slug of concrete, nor does the lower air, of like pressure from the common reservoir, halt until within the field of its activity has been projected sufficient concrete to form any slug.*

"In the nature of things, the patent now stipulating *what the application originally did not*, viz., simultaneous and constant application of both upper and lower air, the lower air can but some disintegrate and aerate the mass of concrete as it rushes by, and thereby lubricate, lighten, and assist its flow through the conduit. The lower air but joins and flows in the same direction and with the stream of concrete. It may be that, if the upper and lower air were alternately applied, some quasi slug action would follow, akin to the action of Sounders' 'air-lift pump,' patent 597,023 of 1896, *but not when simultaneously applied as here.*

"Taking McMichael as it is, *to expect or secure movement of the concrete in alternate slugs of concrete and air would do violence to the laws of nature* and confound reason. It cannot be done. Moreover, the proof is clear, by plaintiff's witness as by defendant's, and some who are interested in plaintiff, that the concrete discharges in a continuous aerated or mixed stream of concrete and air, and not at all in any slug formation."

The four Judges in the Ninth Circuit were unanimous in condemning this slug theory as impossible and fantastic. In any event it is entirely new matter in the McMichael application. All of plaintiff's litigation has been based upon it, and without it the McMichael patent can-

not be construed as anything more than what it *frankly stated itself to be in the original application*, namely, a device for blowing either granular or plastic material, *exactly like all the other blowers of the prior art.*

Returning now to further consideration of the new matter in the amendment of January 21, 1911, the specification proceeds (R.285 beginning line 100) with a discussion of the nature of concrete, and the difficulties and requirements of proper mixing. The specification goes on for the length of a column, and purports or assumes to show that both mixing with shovels by hand, and in the ordinary rotary mechanical mixer (R.286, line 21, *et seq.*) is imperfect. After concluding this dissertation, the description of the alleged and imaginary perfect mixing of the ingredients while in flight in the delivery pipe of the McMichael patent is set forth on page 3 of the patent (R.286 lines 69-94), where it states that either the entire operation of properly mixing the concrete ingredients (*i. e.*, stone, sand, cement and water) or the completion of a preceding partial intermixture is effected by the "powerful jets of air or fluid agent introduced through the pipe 10 as above described * * *". It is preposterous that unmixed cement, sand, stones and water will mix more perfectly while blown through a pipe by an air blast traveling 5,000 feet per minute than in the ordinary mechanical rotary mixer, which is probably familiar to everyone.

This is the method of "treating" concrete which is mentioned in the succeeding claims which will be later discussed. It will be noted that to effect the division into sub-masses and to effect this ideal and perfect intermixing of the previously unmixed or partially mixed stone, sand, cement and water to form perfect concrete, it is

necessary that there be powerful jets of "air of fluid agent" discharged *into the mass of concrete within the chamber*, and directed from within the chamber and within the mass towards the receiving end of the delivery pipe. Well does Judge BOURQUIN comment that it "would do violence to the laws of nature and confound reason. It cannot be done."

This is all that there is to the patent in suit. Otherwise, it is, as it frankly purported to be when filed, only one of the common class of devices for blowing either granular or plastic materials in the usual manner. As to this new and fantastic sub-mass and concrete-mixing theory, these facts are clear:

1. It is entirely new matter, originating in the application on January 24, 1911, four years after the filing of the application.

2. There are no means disclosed either in the application as filed, or as changed by the insertion of the new matter, to produce powerful jets of air from the pipe 10, or any intermittent and alternate action of air pipes 8 and 10.

3. As unanimously stated by the four Judges in the Ninth Circuit, it is absolutely inoperative.

4. There is absolutely no proof whatsoever that the petitioner has ever used it, but the proofs show preponderantly that petitioner has never used this method.

The testimony of Mr. Frank L. Dyer, the expert (R. 243-7), and of Mr. John J. Kennedy, Chief Engineer for the petitioner (R. 206-7), is conclusive that petitioner's machine does not operate by the imaginary slug method. The *four* Judges of the Ninth Circuit state that they are convinced that respondent's machine does not operate by

the slug method (23 Fed. [2] 134; 27 Fed. [2] 841); and the two majority Judges of the Second Circuit Court of Appeals stated that they do not know how it operates (27 Fed. [2] 670, final paragraph). See also, Artingstall (R. 92-96). The great preponderance of evidence, as well as the dictates of sound common sense, brand the "slug" method as imaginary.

Present Suit Based on Soundness of Slug Theory.

In the brief before the Court of Appeals for the Second Circuit (p. 4) respondent stated:

> "The operation of an apparatus made according to the patent and operated according to the method therein defined *produces the peculiar result of first pressing the concrete mass into the outlet and packing it there, then cutting off successive sub-masses or slugs at the outlet, and then propelling these masses or 'slugs' in quick succession through the delivery pipe to the distant point of placement.*"

Respondent is on either horn of the dilemna:

Either the slug method is non-existent (as Judge Bourquin clearly shows it must be where a single steady of continuous second stream of air is used)

Or, the entire McMichael patent is invalid as depending entirely on new matter illegally inserted in the application *four years* after filing.

If the slug method is imaginary, McMichael's device confessedly operates the same as all the prior patents, and is invalid.

If the "slug" theory be correct, the patent was rendered invalid by the introduction of the new matter on January 24, 1911.

Prior Knowledge and Use in This Country.

Section 4886 of the Revised Statutes provides that if any invention is known or used in this country, before the date of the patentee's conception of the invention, his patent is invalid.

Section 4886 is, in part, as follows:

> "* * * not known or used by others in this country, before his invention or discovery thereof. * * *"

As this litigation comes before your Honors, the *Powers-Kennedy Contracting Company* v. *Concrete Mixing & Conveying Company, No. 501*, and *Concrete Mixing & Conveying Company* v. *R. C. Storrie & Company, No. 528*, October Term, 1928, both involve the same McMichael Patent 1,127,660, and have been ordered heard together, so that, in effect, they are one appeal.

We will, therefore, refer not only to the record in 501 but also to the record in 528, using only the findings of fact set forth in the decision of the Circuit Court of Appeals for the Ninth Circuit (*Davis* v. *Schwartz*, 155 U. S. 631, 636).

Entirely regardless of the prior patented art, previously discussed in this brief, the McMichael patent is invalid under Section 4886 of the Revised Statutes because the alleged inventions was,—

> "* * * known or used by others in this country before his invention or discovery thereof * * *" (R. S. 4886).

There were at least three prior uses in this country before January 14, 1907, the date on which McMichael filed his application, and as no testimony was presented by him or his assignees, of any earlier date of invention,

he is under the law limited in both Nos. 501 and 528, to that date, to wit: January 14, 1907.

While McMichael's application was pending in the United States Patent Office, it was put into an interference with,—

(A) an application of Leake, filed October 7, 1907, some nine months after the date that McMichael filed his application. This application of Leake was later assigned to the respondent, Concrete Mixing & Conveying Company, for a consideration of six thousand ($6,000) dollars. The interference between Leake and McMichael appears to have been, after the purchase of the Leake application, a friendly affair, being settled by the parties without taking testimony to determine priority as between these two parties, and, of course, without a decision by the Patent Office on such testimony. The Leake application was assigned to this respondent, and patented on February 13, 1917 by Patent No. 1,215,558.

(B) The other application in the interference was filed by William W. Darley, who had applied for a patent on "apparatus for handling ashes and other materials," showing that the Patent Office considered blowing "ashes and other materials" as being the same invention as blowing concrete.

Darley's pleadings, or what is known in the Patent Office as a preliminary statement, in which he set forth his dates of invention and other data, did not antedate the filing dates of McMichael and Leake, so that on the record, without any testimony having been taken, and simply on the pleadings, a judgment was entered

> "that Darley is not the first inventor" (Ulen Record, p. 214).

He being eliminated, the interference was continued between Leake and McMichael, the interference being subsequently settled by payment to Leake of $6,000, without taking testimony, or having the Patent Office make any judicial decision on any evidence, as to which of these parties was the prior inventor. In this settlement, Bliss, the attorney for the respondent, Concrete Mixing & Conveying Company, became the assignee of the Leake application, subsequently assigning the application to the respondent, to whom the Leake patent was issued. It is reasonable, therefore, to assume that the respondent, Concrete Mixing & Conveying Company, was the real purchaser of the Leake application, and this was the holding of Judge BOURQUIN in 23 Fed. (2) 131 (Appendix to our Petition for Certiorari, p. 32) and of the Court of Appeals for the Ninth Circuit in 27 Fed. (2) 838 (said Appendix, p. 43).

(As all the decisions on this patent are printed in the appendix to our Petition for Writ of Certiorari, we will hereinafter, for the convenience of the Court, refer to the page of this appendix.)

Prior Use in New Orleans and Chicago by Leake.

The prior use in New Orleans and Chicago was in 1905, whereas McMichael did not file his application until January 14, 1907, which, in the absence of any rebuttal proof or testimony carrying his date of invention back of his filing date, is the date of his invention. The only reasonable assumption is that no such testimony was presented because he had none to present. If he, or his assignee, the respondent, did have such evidence, they would obviously not have paid Leake $6,000 for his application in interference with McMichael.

This prior use was by Leake, and is in Case 528.

In support of Leake's testimony of prior use in 1905, it is to be noted:

(a) He testified, reluctantly, on the witness stand, against his assignee;

(b) He filed on October 7, 1907, only some nine months after McMichael, his application, now Patent No. 1,215,558, which is documentary evidence;

(c) That to get control of his invention, McMichael, in interference with him, bought his invention for $6,000. If McMichael, or the respondent, his assignee, could have proved earlier dates of invention, they would not have paid this relatively large sum of $6,000, as it would have been totally unnecessary, for, if McMichael could prove earlier dates, he would have been awarded the patent, or claims, without paying Leake anything.

(d) Respondent took no rebuttal evidence in the Ninth Circuit suit to contradict Leake.

The Court of Appeals for the Ninth Circuit stated:

"There was no denial of the truth of his testimony." (Appendix, p. 49.)

Decisions on Prior Use by Leake—In New Orleans and Chicago.

As to the prior uses by Leake in New Orleans and Chicago:

Judge BOURQUIN held:

"For the purposes of interference, to McMichael the Commissioner suggested four claims, including

the claim aforesaid verbatim from Leake, which McMichael promptly accepted as substitutes for his six, thereupon canceled by him. *The interference was not concluded,* for that plaintiff became assignee of both applications." (Appendix, p. 31.)

Again on page 40 of the Appendix:

"* * * but, as between them, in its present aspect *in McMichael it is the idea and method of Leake, and not McMichael,* in that, prior to McMichael, Leake had conceived the idea, *and in 1905 in New Orleans had publicly and successfully employed it in concrete building operations.*

"For, despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence in quality and quantity *inspires confidence and constrains conviction of the truth of the fact and beyond reasonable doubt.* Neither of them, however, is inventor of the thing. Before them, it was old in the art."

The Court of Appeals for the Ninth Circuit held (Appendix, pp. 47-49):

"It is assigned as error that the trial court found that *Leake* had made the invention in issue prior to the date of McMichael's application. In the opinion of the trial court it is said, 'Prior to McMichael, Leake had conceived the idea *and in 1905 in New Orleans had publicly and successfully employed it in concrete building operations,* for *despite Leake's reluctance to testify* against his assignee, the plaintiff, *the evidence, in quality and quantity, inspires confidence and constrains conviction of the truth of the fact, and beyond reasonable doubt.*' The McMichael application was filed January 14, 1907, and nine months later, on October 7, 1907, was filed Leake's application, which presented everything contained in the McMichael application with the

exception of the U-bend. Leake said: 'The object of my invention is to provide a method and apparatus for preparing a concrete mixture and delivering it while in a plastic condition to the place where it is to be utilized. Another object of my invention is to move plastic concrete from one place to another by means of air pressure.' On May 12, 1909, interference was declared between McMichael and Leake *and Wm. W. Darley,* who had applied for a patent on *'apparatus for handling ashes and other materials.'* Leake and Darley each filed an affidavit setting forth their respective dates of conception and reduction to practice. Darley was dismissed from the interference as being found subsequent in time to the others. Leake's affidavit stated that he 'conceived the invention set forth in the declaration of interference *on or about the 1st day of February, 1905,* that he first made drawings of the invention on or about the 1st day of March, 1905, and first explained the invention to others on or about the 1st day of June, 1905, that he first embodied his invention in a full-sized machine, which was completed *on or about the 1st day of September, 1905, and that on or about the 1st day of September, 1905, the said machine was first successfully operated in the City of New Orleans,* and State of Louisiana, and that he has since made and used other machines embodying the same invention.' Before the interference was declared it was represented on behalf of Leake's application that he had done a large amount of experimental work in connection with his invention. *'He has successfully moved concrete from the place where it is mixed to the place where it is to be used, by means of air pressure, using the apparatus disclosed in his application.'* Again it was said: 'He has given considerable time and thought to this matter and has actually constructed several plants where this is done. *Their operation is highly successful* and

> appears to be a decided improvement over previously known methods for handling plastic concrete.' *But no showing was made or evidence offered to carry the McMichael invention further back than the date of his application* nor was any proceeding had in the Patent Office upon his application until 19 months thereafter *when, for a consideration of $6,000,* Leake assigned his application to McMichael's attorney, who later assigned it to the appellant, which had also become the owner of the McMichael application. The long period of inaction and silence on the part of McMichael, unexplained as it is, *together with the payment to Leake of so large a sum of money as $6,000,* payable, as it was, in annual installments until March 1, 1920, is strongly suggestive of the inference that *McMichael recognized the priority of Leake's invention and could furnish no proof to the contrary.*"

Concerning Leake's testimony as a *reluctant* witness against his assignee, the present respondent, the Court of Appeals stated as follows (Appendix, p. 49):

> "* * * As a *witness* for the appellee in the court below, Leake testified that he conceived the idea of moving concrete as set forth in his application, about February 1, 1905; that he made a container in which to put the concrete and by the means of an air pipe extending therefrom *shot it up on top of a powerhouse then being constructed in New Orleans;* that when the air pressure was applied, the concrete all went up and landed on there; that later he built a commercial apparatus in Chicago and *operated it in conveying dry cinders to the fifth floor of a building.* His testimony, together with his preliminary statement, carried the date of his invention back of that of McMichael and showed an actual *reduction to practice by Leake as early as 1905.* We find no ground for disturb-

ing the trial court's conclusion. The question at issue was, which of two applicants for patent was the inventor? Both presented drawings and plans of the same invention. Leake furnished evidence of the time, place and circumstances of the reduction of his invention to practice. *There was no denial of the truth of his testimony.* In *Armstrong* v. *DeForest Radio Telephone & Tel. Co.*, 280 Fed. 584, 590, it was said: 'While it is true that uncorroborated testimony of an inventor is to be accepted with caution * * * yet there is no rule of law that requires the rejection of the uncorroborated testimony of an inventor as to the date of its conception. The Court must be satisfied as to the fact of the demonstration and that the conception was complete.' In *Reed* v. *Cutter*, 1 Story 590, 596, Mr. Justice STORY said: 'If the invention is effected and put into actual use by the first and original inventor, it is of no consequence whether the invention is extensively known or used, or whether the knowledge or use thereof is limited to a few persons, or even to the first inventor himself.' So in *C. F. Mueller Co.* v. *A. Seregas Sons*, 12 Fed. (2d) 517, 518, considering the question which of two was the real inventor, Judge HOUGH said: The question of invention as between Mueller and Wild is really only one of veracity. There are no presumptions or artificial rules regulating such an investigation, and the evidence of one witness may be sufficient,' citing *Thompkins* v. *N. Y. Woven Wire, etc. Co.*, 159 Fed. 133. That the testimony of one witness may be sufficient in such a case is held in *Mayor* v. *A. & H. G. Mutschler*, 248 Fed. 911, 914, where it was said that one witness may suffice *if the surrounding circumstances are confirmatory.*"

This finding of fact by Judge BOURQUIN, Appendix, page 32, and by the Circuit Court of Appeals for the Ninth Cir-

cuit, Appendix, page 43, of prior knowledge and use in this country before the date of McMichael's alleged invention (January 14, 1907), is based on the testimony, and under the authority of this Court

"* * * *it must be treated as unassailable.*"

Your Honors in *Davis* v. *Schwartz*, 155 U. S. 631, 636, 39 L. Ed. 289, 291, 15 Sup. Ct. Rep. 237 held:

> "1. As the case was referred by the court to a master to report, not the evidence merely, but the facts of the case, and his conclusions of law thereon, we think that his finding, so far as it involves questions of fact, is attended by a presumption of correctness similar to that in the case of a finding by a referee, the special verdict of a jury, the findings of a circuit court in a case tried by the court under Revised Statutes, par. 649, or in an admiralty cause appealed to this Court. In neither of these cases is the finding absolutely conclusive, as if there be no testimony tending to support it; *but so far as it depends upon conflicting testimony, or upon the credibility of witnesses, or so far as there is any testimony consistent with the finding, it must be treated as unassailable. Wiscart* v. *Dauchy*, 3 Dall. 321; *Bond* v. *Brown*, 12 How. 254; *Graham* v. *Bayne*, 18 How. 60, 62; *Norris* v. *Jackson*, 9 Wall. 125; *Insurance Co.* v. *Folsom*, 18 Wall. 237, 249; *The Abbotsford*, 98 U. S. 440."

Your Honors again laid down this law, this time in a patent case, *Adams* v. *Gilliland*, 242 U. S. 350; 37 Sup. Ct. Rep. 169, 170, as follows:

> "* * *, the case is preeminently one for the application of the practical rule that so far as the finding of the master or judge who saw the witnesses 'depends upon conflicting testimony or upon

> the credibility of witnesses, or so far as there is any testimony consistent with the finding, it must be treated as unassailable.' Davis *v.* Schwartz, 155 U. S. 631, 636, 39 L. ed. 289, 291, 15 Sup. Ct. Rep. 237."

Therefore, this entire litigation should be decided against the respondent on the ground that McMichael cannot have a valid patent under Section 4886 of the Revised Statutes, which expressly requires that the alleged invention be,—

> "* * * not known or used by others in this country, before his invention or discovery thereof * * *" (R. S. Section 4886).

Testimony of Prior Use Also in Chicago, in Case 501.

It is really unnecessary to go into the testimony of prior use in Case 501, in view of the testimony of prior use and the decisions supporting it, in Case 528.

The testimony of prior use in Case 501 centers around Exhibit H, which is a printed publication, being the Journal of the Western Society of Engineers of May, 1918, Vol. 23, No. 5, copyrighted in 1918. This was some six and one-half years before any suit was brought by the respondent on the McMichael patent.

Mr. Kirkland, the chief engineer of the respondent, had been installing and using these McMichael concrete blowers for some five years or more, and read an article on the operation of the McMichael concrete blower, before the Western Society of Engineers in Chicago, the article being entitled "The Pneumatic Method of Concreting."

As is customary at such meetings, the engineers at the meeting on May 13, 1918, discussed Mr. Kirkland's address. One of the engineers present, who discussed the paper,

was Mr. William Artingstall. The article as well as the discussion was published and copyrighted in May, 1918, and is, as previously noted, Exhibit H in Case 501.

On page 353 of Exhibit H appears the following:

> "Mr. Wm. Artingsall: The development of the pneumatic mixer is interesting. *About fifteen years ago this device was used in connection with an ordinary mixer as a transporting agent.* The concrete was dumped into the hopper and *transported by air pressure.* The contractor, however, put something over on the engineers. He ran a batch of two through the hopper without putting it through the mixer, and discovered that he had a pretty good mix. From that time on it was dropped until about 1907 or 1908, when the Drake Machine Company, here in Chicago, took it up and started to improve it. We tried it out in the LaSalle Street tunnel. I think that was the first time it was used after 1903. * * * We used this system on account of the convenience more than anything else, but we found we had the best concrete, and we used it practically everywhere we could after that. I think you will find that if the mixers of the present time compare with the ones used at that time, the work will compare favorably with the ordinary mixed concrete work" (R. p47

It was through this article, copyrighted in 1918, that we got in touch with Mr. Artingstall, and found that he was a practicing civil and structural engineer in Chicago, and also employed by the City of Chicago as consulting engineer, the record, showing that the City of Chicago pays him $5,000 a year for a portion of his time.

He remembered the article and the concrete blower which he stated in the discussion in May, 1918, was used in 1903. He was called by the defendant and gave his testimony on the stand (R.32-52 He is a man of high

standing in his profession, and entirely disinterested. He was corroborated by Mr. Fanning, a contractor of ability and experience, who built and operated the concrete machine (R.112-124

Mr. Artingstall fixes the date when he saw this pneumatic concrete blower laying the floor in 177 East Monroe Street, Chicago, Illinois as in 1903, because it was prior to his marriage on June 18, 1904 (XQ263, R. 103). *This coincides with his statement in the discussion of Mr. Kirkland's article in the Journal of the Western Society of Engineers in 1918 that it was about 15 years earlier that he saw concrete blown by air,* in the manner stated in Mr. Kirkland's article. Mr. Fanning was called and corroborated Mr. Artingstall (R.112-140 as to the use of this pneumatic blower in laying the concrete floor at 177 East Monroe Street, Chicago, Illinois.

This evidence of prior use, unlike the evidence of prior use in Case 528, respondent attempted to rebut. Several witnesses were called in rebuttal and at least one of them, Ericson, was proved on cross examination unworthy of belief on a matter wherein he could not have been mistaken (R 148,149; 197,198 The other rebuttal testimony was also, in the opinion of your petitioners, of no weight. Lynch swore (R.184 that he inspected the work and reported personally to Ericson, as City Engineer, twice a week during 1902, 1903 and 1904. Ericson was forced to admit he did not hold the office during that time. With the exception of the testimony of Slade, who produced a written document, Plaintiff's Exhibit No. 15, being a copy of his report on the inspection of the building at 177 East Monroe Street, dated January 23, 1904, which date was prior to the concreting of the floor, he testified that the floor was concreted the following June or July, 1904 (XQs160, 161, R. 169.

The production of this witness with this documentary evidence, Plaintiff's Exhibit No. 15, and his hostile testimony based thereon, conclusively proved that this floor was concreted in June or July, 1904. In the light of this documentary evidence, Artingstall and Fanning were recalled and testified that in view thereof, the floor must have been concreted in June, 1904, which corresponds with the documentary evidence and corroborates the testimony of plaintiff's hostile witness Slade.

The fact remains that in Case 501 the testimony of Artingstall and Fanning is based on the following documentary evidence:

> (a) Exhibit H, Journal of the Western Society of Engineers, published in May, 1918, some six and a half years before any suit was brought under the McMichael patent, and *at which time* Artingstall stated that he had seen such a concrete blower in use "about 15 years ago."
>
> (b) Plaintiff's Exhibit No. 15, dated January 23, 1904, and the testimony of the hostile witness, Slade, that the floor was concreted in June or July, 1904, fixing the dated of the prior use 14 years before Kirkland's article before the Society of Western Engineers, instead of 15 years before.

There were, of course, no contemporary sketches produced by Artingstall or Fanning. Had there been, that very fact would have been suspicious. They made drawings from memory (Fig. 2 of Exhibit E and Exhibit I) of the machine, which was substantially the same as the Warren and Farnham patents.

This concrete blower used in 1904 was built by Fanning for Jackson, and Clark, chief draftsman for Jackson, tes-

tified it was Jackson's practice to build many machines without making drawings (R. 195-6 Notwithstanding this explanatory testimony of Clark, a hostile witness, the testimony of prior use in 501 was held insufficient both by the Trial Court and on appeal because no contemporary drawings or sketches were introduced in evidence.

But entirely regardless of such testimony in 501, the prior use testimony in 528 is conclusive that Leake used the alleged invention in New Orleans and in Chicago, Illinois, in 1905, and applied for a patent only a few months after McMichael's application was received in the Patent Office; and that his testimony in 528 was unrebutted and uncontradicted; and is now, under the decisions of this Court "unassailable." *Adamson* v. *Gilliland*, 242 U. S. 350; 37 Sup. Ct. Rep. 169, 170; *Davis* v. *Schwartz*, 155 U. S. 631; 15 Sup. Ct. Rep. 237.

Errors in the Decisions in the Second Circuit.

From the opinion of the Court of Appeals for the Second Circuit, Chief Judge MANTON dissented. Judges LEARNED HAND and SWAN joined to affirm the decision of the District Court, the opinion being written by Judge SWAN. The majority of the circuit judges reached their agreement to affirm the District Court through a series of errors, which we will consider now in several details.

The first error of the majority of judges was in their consideration of the meaning of the decision of this Court in *Concrete Appliances Co.* v. *Gomery*, 269 U. S. 177, wherein they held:

> "The new matter is, of course, open to us and will be dealt with hereafter. The Supreme Court case, however, contains nothing, in our opinion,

> which casts doubt upon the correctness of the Ulen decision; in fact, it was before us when that decision was made. It holds, affirming the judgment of the Circuit Court of Appeals for the Third Circuit in 291 F. 486, that the Callahan patent, which covered an apparatus operating on the gravity principle for distributing 'wet' concrete, was invalid, because it merely made use of known methods and appliances for the convenient handling of this recently accepted building material. The appellants' argument runs that, since the Supreme Court emphasizes that old apparatus used for distributing water, grain, or coal was readily adaptable for handling concrete, so the prior art patents for blowing sand, grain, or grout, which in the Ulen case were held not to invalidate McMichael's patent, should now be deemed complete anticipations of it. But the Gomery decision does not rest merely on the assumption that apparatus for coal and grain could have been used for wet concrete without inventive thought. *Adaptations of old carriers to handle concrete were shown to have been frequently made for several years before the application for the patent there in suit.* The idea was already of common knowledge and was being applied generally. Therefore Callahan's adaptation was not an invention."

The majority of judges read this decision much too narrowly. They erroneously held that the *Gomery* decision hung solely on the fact that "adaptation of old carriers to handle concrete were shown to have been frequently made for several years before the application for the patent there in suit. The idea was already of common knowledge and was being applied generally. *Therefore,* Callahan's adaptation was not an invention."

This is entirely too narrow a reading of that decision,

which, as we understand it, lays down a much broader principle as to the prior art and development, as follows:

> "To say nothing of the universally known methods and appliances for raising and distributing water, there were ready at hand widely used and generally understood appliances for the *elevation and distribution* of *mobile substances,* such as *grain* and *coal,* which involved, both in principle and in practical detail, all the elements described in the Callahan claims. Failure to make use of these obviously applicable methods and appliances in combination, suitable to the particular work in hand, in dealing with a new, plastic material capable of similar treatment, would, we think, have evidenced a want of ordinary mechanical skill and of familiarity with construction problems and methods."

This principle laid down as to the obviousness of the application of devices for the elevation and distribution of mobile substances, such as grain, coal and water, requiring only mere mechanical skill, is based purely upon the *knowledge and perception* of the *common property or characteristic of mobility or fluency* possessed by *all* of these different substances. *The decision holds broadly that it is the existence and perception of this common property or characteristic that makes all of these devices analogous, and the adaptation or conversion of a device from one of these materials to another merely a double use.* The succeeding language referring to previous uses of conveying devices with liquid concrete was, as we read it, simply cited as corroborating this fundamental principle.

But, taking the *Concrete Appliances Co.* v. *Gomery* decision even of the narrow scope laid down by the

majority judges of the Second Circuit, they are still in error in not applying and following it. Taking the decision from their own erroneous basis, in the prior art before the Court were Smith patents 122,497 and 122,498, describing the preparation of liquid concrete, and method of blowing it, and disclosing the closed cylindrical chamber with the delivery pipe communicating from the bottom thereof and the compressed air pipe communicating into the top thereof. This was an "adaptation of old carriers to handle concrete," which according to the Second Circuit Court would bring the present case under the *Gomery* decision to invalidate the McMichael patent. Even reading the decision as of the scope erroneously contended by the majority judges here, it still would thus put upon them the duty of invalidating the McMichael patent on the prior patents hereinbefore described.

The second error of the majority judges in the Second Circuit rests in the next succeeding paragraph of the decision, which reads as follows:

> "But that is a very different situation from the one before us in the Ulen case, where *nobody before McMichael had ever used a pneumatic apparatus to transport concrete.* The Warren and Farnham sand-blast machines (patents No. 671,303 and No. 747,396) could not have been so used without increasing the size of the discharge pipes and cutting off the sand-blast nozzles. To do this was to make a new machine, and one who thought of doing it would have had a new and inventive idea; that is, that of *blowing concrete which had not been done before.* When that is so, the physical change in the apparatus need be very little to sustain a patent. The only reason why a new one is not patentable is that the law grants patents only for new things, not for new ideas. Similarly Goldie's

> machine (patent No. 707,840) for blowing cement could not, so far as appears, have been used as it stood for concrete, and never was so used. The Supreme Court case does not require us to reconsider the validity of McMichael's patent." (Italics our own.)

We confess that after the very careful presentation of proofs, the full discussion in the briefs, and the full presentation of argument on Smith patents 122,497 and 122,498 we were both amazed and disheartened to have the Court hold that: *"Nobody before McMichael had ever used a pnuematic apparatus to transport concrete."* Here is a flagrant error of fact, which is patent from a mere cursory examination of the face of the record, and we contend that we are entitled to a reversal on this one mistake of fact alone. There can be no sane questioning of the nature of the disclosure of the Smith patents 122,497 and 122,498. It is unnecessary to argue their clear disclosure of liquid concrete and the mechanism for "blowing" it.

The invalidating bearing of these Smith patents, *in* themselves and in view of the numerous other patents showing the introduction of compressed air at the bend of the delivery pipe has been fully discussed hereinbefore, and need not be repeated.

As to the theory in the preceding paragraph that a mere changing in the size of the pipes and nozzles of Farnham and Warren amounted to invention, the contrary is established by following extract from the specification of the McMichael patent (R.286 lines 107-122) as follows:

> "* * * The best results are attained by having the delivery pipe of a relatively large diameter so that there shall be freedom for these relative move-

> ments of the rock particles and of the sub-masses that are forcibly impelled ahead of the air jet. The delivery pipe itself becomes a mixing chamber wherein pneumatic mixing is effected or continued, and, if this duct is of a size properly related to the other parts, and to the sizes of the particles of the materials, the latter can be rapidly impelled through it without danger of clogging or choking. *The engineer, in any instance, will readily understand what the relative proportions of the parts should be;* * * *"*

This is a clear statement by the patentee himself that the proportioning of these pipes is a mere matter of mechanical skill, and would not be "a new and inventive idea" as stated by the majority judges.

In the next succeeding paragraph of their decision, the majority judges held as follows:

> "In the suit against Storrie & Co., Judge Bourquin seems to have relied to some extent, at least, upon patents which were not in the record in the Ulen case and are not now before us. *But whatever the court as now constituted might think of the correctness of our former ruling, it is our duty to follow it,* unless new evidence raises questions of the patent's validity not previously considered. See Cortelyou *v.* Charles E. Johnson & Co., 145 F. 933, 934 (C. C. A. 2); Crier *v.* Innes, 170 F. 324 (C. C. A. 2)."

The two Smith patents Nos. 122,497 and 122,498 were such "new evidence" raising questions of the patent's validity not previously considered, as required by the Court, and the evidence that the Court, in effect, absolutely ignored these patents is conclusive from the preceding paragraphs of the decision already discussed. The

Smith patents were not in evidence in the *Ulen* suit, nor were they cited by the Patent Office against the McMichael application. The C. C. A. Ninth Circuit stated there was uncontradicted evidence showing that the Smith patents are operative.

The next paragraph of this decision of the majority judges is most astonishing, and may we say with all due respect, most astonishingly illogical. This paragraph reads as follows:

> "The new evidence of the patent art upon which appellants rely to distinguish the Ulen decision includes two patents granted in 1872 to W. H. Smith. No. 122,497 is for an improvement in concrete pavements and claims concrete 'prepared for use in a liquid or semiliquid condition, capable of flowing in pipes and running into molds.' No. 122,498 discloses a machine for mixing liquid concrete and conveying it by a discharge pipe from the mixer to the spot where it is to be laid. The concrete is to flow through the discharge pipe by gravity, or, as an alternative, after flowing by gravity through a small winding passage into a chamber, F, is to be forced into the discharge pipe by the pressure of steam or compressed air admitted into the chamber above the mass of the concrete. The chamber has a flat bottom of large area relative to the size of the discharge pipe, the outlet of which opens into the center of the bottom. While this machine discloses the idea of forcing concrete through a pipe by compressed air, whether it was practically operable may well be doubted. It would seem that a large quantity of the concrete, or at least the stones of which it is partly composed, would necessarily accumulate upon the flat bottom of the chamber. In any event, it was very different from McMichael's device, which injects air into the concrete at its entrance into the discharge outlet. It cannot be regarded as an anticipation."

In the second preceding paragraph the majority judges stated "*nobody before* McMichael had ever used a pneumatic apparatus to transport concrete. * * * To do this was to make a new machine, and one who thought of doing it would have had a new inventive idea; that is, that of blowing concrete, *which had not been done before.*"

In the last quoted pargaraph, in speaking of the Smith patents, the majority opinion states:

> "No. 122,498 discloses *a machine for mixing liquid concrete and conveying it by a discharge pipe from the mixer to the spot where it is to be laid.* * * * after flowing by gravity into a chamber F, is *to be forced into the discharge pipe by the pressure* of steam or *compressed air admitted into the chamber above the mass of concrete.*"

These statements of fact in these successive paragraphs of the decision are absolutely contradictory of each other.

In practically throwing out the Smith patents, and ignoring their invalidating significance, the majority judges held "whether it was practically operable may well be doubted." There is no word of evidence to support this theoretical assumption upon which they erroneously dismissed consideration of the Smith patents.

Mr. Dyer, an eminent patent expert, regarded the Smith patents as operative, and so testified (R. 314).

The Smith patents in themselves give intrinsic evidence of having been practically worked out. In patent 122,497 (R.297, lines 30, *et seq.*), Smith states:

> "Such composition, however, I have discovered, *and have proved by a thorough course of experiments and trials,* its complete fitness for the purposes and the great practical utility of its application in the manner referred to."

As to Smith patent 122,498 the Court of Appeals for the Ninth Circuit in their unanimous decision, 27 Fed. (2) 838, stated:

> "Of the prior patents we find it necessary to refer particularly to but three, the patent to Smith, No. 122,498, of January 2, 1872, and the English patents to Duckham, one No. 4,400 of 1875, and one No. 15,348 of 1885. The Smith patent was for 'an improvement in the manufacture of concrete pavements and machinery for same.' The specifications described the apparatus as specially adapted to the manufacture and convection of concrete composition through pipes so as to set quickly upon reaching its destination and form a solid mass of artificial stone, **and uncontradicted testimony was given of the successful use of the Smith machine in conveying concrete through a pipe by compressed air.** The device *contained all the features of the appellant's patent except the nozzle for admission of air near the point of exit.*"

The Court of Appeals for the Second Circuit committed decisive error in brushing these Smith patents aside on a mere theoretical and unsupported assumption of inoperativeness, which is controverted by the facts above set forth.

That the prior art was not fairly and fully considered in *this* suit, over the *Ulen* suit, notwithstanding its differences, is frankly stated by the majority judges (27 Fed. [2] 671), as follows:

> "Apparently the 'slug' theory was brought into the argument because it was thought necessary to distinguish in this way from Farnham, Warren, and Goldie. We have already suggested that those machines would require modifications to operate with concrete containing stones an inch and a half

> in diameter. Whether this was the ground adopted to distinguish them in the Ulen Case, *or whether the court as then constituted accepted the slug theory, does not appear*, and is not important. *On some ground we distinguished the prior art, and sustained the validity of the patent, and that ruling we should follow, until its error is pointed out by higher authority.*"

We submit that the manifold errors of fact and law pointed out in the opinion of the majority judges in the Second Circuit, in themselves alone, entitle us to a reversal.

In the second paragraph under subdivisions (3, 4) of their decision, the majority judges throw out the "slug" theory of operation. This is a complete reversal of the finding of fact of the district judge, upon which he directly and solely based his judgment of infringement, namely, that both petitioner and respondent's machines or devices operate by the slug method.

On this point, the majority judges of the Court of Appeals, in the paragraph indicated held:

> "* * * *The patent says nothing which commits the patentee to the slug method of operation.* The theory is built upon the use of the phrase 'submasses,' as in lines 72 and 89, page 2, where it is said that the lower air jet 'engages with the submasses to push them along.' But this cannot mean solid 'slugs,' for *on the same page, lines 92-99, the effect is said to be thoroughly to commingle all the ingredients and insure a better mix.* Again, at line 113, page 3: 'The delivery pipe itself becomes a mixing chamber, wherein pneumatic mixing is effected or continued.' And see, also, line 86, page 3. **Such statements necessarily forbid the notion of solid slugs.**" (Italics ours.)

It is easy to realize the perplexity of the Court in considering together these two theories set up in the patent, namely, the sub-mass or "slug" theory and the theory that concurrently the unmixed ingredients of the concrete are mixed perfectly while flying through the pipe. They are assuredly irreconcilable and mutually exclusive, either from the standpoint of physical laws, or common-sense reasoning.

In all the litigation, however, there can be *no question whatsoever that the plaintiff-petitioner has based the McMichael patent fairly and solely on the solid slug theory.* Referring to the record in the *Ulen* suit, Exhibit D, page 49, folio 145, Kirkland, respondent's chief engineer, testified:

> "The air breaks up or penetrates the mass as it goes toward the outlet, detaching portions of it, *so that these portions will present a surface to the oncoming booster jet* so that they may be forced through the pipe."

Mr. Ray, plaintiff-respondent's expert in the *Ulen* suit, testified (Ulen Record, p. 127, fol. 381):

> "The pipe 10 which admits air to the bottom of the mass of concrete near the discharge of the receiver 1 builds up a pressure at that point and *cuts off, right at that point, a cylinder of concrete.*"
> * * * * * * *

(p. 128, fol. 383):

> "Now, as that *cylinder of concrete* passes out into the pipe, * * * and since *the cylinder of concrete* moves away rapidly * * *."
> * * * * * * *

(p. 129, fol. 386):

> "The net result of that is that it is possible to *handle this concrete in slugs* through a long pipe * * *."

There can be no question, in the face of this testimony of Mr. Kirkland, the chief engineer, and Mr. Ray, the expert employed by the respondent, that they base the novelty of their patent, and the question of infringement by others absolutely on the "slug" theory. Thus, the Court of Appeals departs entirely from the very basis of the record, and of the decision in the Court below, and still holds the patent to be infringed.

In the two suits here at bar, of the seven judges who have rendered opinions, at least six of them reject the "slug" theory of operation of plaintiff's device (Judge MANTON dissented without opinion). There can be no question that if the McMichael device does not operate on the slug principle, *it operates precisely as do all the devices of the prior art.* We are unable to understand, after abandoning the "slug" theory on what basis the majority judges in the Second Circuit Court of Appeals still differentiate the McMichael patent from the Beach, Warren and Farnham patents. It is true that the Court states in paragraph 1 of the decision that in order to use the devices of these patents to blow concrete, it would be necessary to increase the size of the discharge pipes and to cut off the inner end of the sand blast nozzle. *This is in effect holding that increasing the size of the pipes amounts to invention.* If that be sound law, then a second applicant for patent with a four inch pipe could secure a valid patent over a prior patentee showing a two inch pipe; and a third applicant with a four and one-half inch pipe could

secure a valid patent over both of the foregoing. On this point also the patent in suit states (R.286, lines 120-123) that proportion of parts is entirely within the skill of the engineer. We submit that considering the decision of the majority judges in the Second Circuit, they have no ground, after abandoning the "slug" theory, other than *that it requires invention to enlarge and reform the discharge pipe of the prior patents*, for holding the McMichael patent valid.

The Particular Claims in Suit.

We submit that the various grounds hereinbefore set forth for holding the McMichael patent totally invalid are so varied and strong, that great expenditure of time and thought on specific claims is neither warranted nor necessary. The specific claims involved in this suit are 2, 4, 6, 17, 21, 22, 28, 34 and 35.

Each of these claims is limited to the method of, or mechanism for, mixing the *"concrete forming" materials* by the blasts of compressed air while the charge of materials is being blown through the delivery or discharge pipe. EACH of these claims has in its preamble the phrase "a chamber for containing *concrete forming materials*" or its equivalent. That expression does not describe concrete, but *does* describe sand, stones, cement and water *before they have become concrete*. Each claim then specifies the method of, or means for, blowing these *concrete forming materials* through the delivery or discharge pipe to mix them together *to make concrete* (R.286 lines 69-94). Each of these claims and the specification as referred to dovetail exactly to cover the concrete *mixing* process.

Therefore, every one of the claims is based on the new matter illegally introduced into the application in 1911.

If the claims are read otherwise, and the device be regarded merely as a blower of granular and plastic materials, then they read directly on the prior patents and are invalidated thereby.

In addition, nearly all of the claims specify, in more or less definite language, two compressed air pipes, both discharging into the mass of *concrete forming materials within the chamber*, for example: R. 287 lines 103-7, lines 124-6; R. 288 lines 14-17; R. 289, lines 19-22. Thus, this feature also is based on the new matter. If they be limited to the precise location of the air pipe 10, they are not possibly infringed. If not so limited, they are invalid for new matter, and (irrespective of the reference to the unmixed ingredients) are also invalidated by reading directly on the prior patents which show a second air pipe discharging into the bend of the delivery pipe. This feature is shown in *nearly all the patents in the prior art.* Petitioners adopted it from these *expired* patents.

It is submitted that the claims considered individually are all invalid for the reasons stated.

If the mechanism claims be read to give effect to their *actual* words and import, *i. e.*, "a chamber for containing *concrete forming* materials," they are in actuality *nothing more than disguised method or process claims* for the new method of mixing the concrete forming materials while being blown through the delivery pipe, *which was illegally introduced into the application as new matter in 1911.*

Claims must be read to *give effect to all their terms, in the light of the specification.*

In *Singer Co.* v. *Cramer*, 192 U. S. 265; 24 S. Ct. Rep. 291, 299, this Court held:

> "To prevent a broadening of the scope of the invention beyond its fair import, in the light of the

circumstances surrounding the issuance of the patent, the words of limitation contained in the claim must be given due effect, and giving them such effect, the statement in the first claim of the elements entering into the combination must be construed to refer to elements in combination having substantiaily the form and constructed substantially as described in the specification and shown in the drawing."

In *Motion Picture Co.* v. *Universal Film Co.*, 243 U. S. 502, 37 S. Ct. 416, 418, this Court held:

"1st. *The scope of every patent is limited to the invention described in the claims contained in it, read in the light of the specification.* These so mark where the progress claimed by the patent begins and where it ends that they have been aptly likened to the description in a deed, which sets the bounds to the grant which it contains. It is to the claims of every patent, therefore, that we must turn when we are seeking to determine what the invention is, the exclusive use of which is given to the inventor by the grant provided by the statute,—*'He can claim nothing beyond them.' Keystone Bridge Co.* v. *Phoenix Iron Co.*, 95 U. S. 274, 24 L. ed. 344; *Lehigh Valley R. Co.* v. *Mellon*, 104 U. S. 112, 118, 26 L. ed. 639, 641; *Yale Lock Mfg. Co.* v. *Greenleaf*, 117 U. S. 554, 559, 29 L. ed. 952, 953, 6 Sup. Ct. Rep. 846; *McClain* v. *Ortmayer*, 141 U. S. 419, 424, 35 L. ed. 800, 802, 12 Sup. Ct. Rep. 76."

In *White* v. *Dunbar*, 119 U. S. 47, 7 S. Ct. Rep. 72, 74, this Court held:

"We see nothing in all this to raise the slightest implication that the patentees were the inventors of the process of interposing any and every kind of lining between the cans and their contents, and, when their claim is confined to a lining of textile

fabric, it is tantamount to a declaration that they claimed nothing else. *Some persons seem to suppose that a claim in a patent is like a nose of wax, which may be turned and twisted in any direction, by merely referring to the specification, so as to make it include something more than, or something different from, what its words express.* The context may, undoubtedly, be resorted to, and often is resorted to, for the purpose of better understanding the meaning of the claim; but not for the purpose of changing it, and making it different from what it is. The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; *and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms.* This has been so often expressed in the opinions of this court that it is unnecessary to pursue the subject further. See *Keystone Bridge Co.* v. *Phoenix Iron Co.*, 95 U. S. 274, 278; *James* v. *Campbell*, 104 U. S. 356, 370."

Authorities.

All the prior patents are in the general art of blowing granular and plastic materials and are invalidating. In the light of these cases, *this would be so, even if the Smith patents did not disclose the "blowing" of concrete.*

> *Atlantic Works* v. *Brady*, 107 U. S. 192; and
> *Hollister* v. *Benedict*, 113 U. S. 59, quoted and followed in *Concrete Appliance Co.* v. *Gomery*, 269 U. S. 177.

In *Lovell Manufacturing Co.* v. *Carey*, 147 U. S. 623, it was held:

> "* * * But it does not amount to invention to discover that an old process is better in its results,

when applied to a new working, than would have been expected; the difference between its prior working and the new working being only one of degree, and not one of kind. It has been often held that the mere fact that one who uses a patented process finds it applicable to more extended use than has been perceived by the patentee is not a defense to a charge of infringement. *It follows necessarily that the public cannot be deprived of an old process because some one has discovered that it is capable of producing a better result, or has a wider range of use than was before known.*

"In *Smith* v. *Nichols*, 21 Wall. 112, it was held that a mere carrying forward, *or new or more extended application, of the original thought; a change only in form, proportions, or degree;* the substitution of equivalents; doing substantially the same thing in the same way, by substantially the same means, with better results,- -was not such invention as would sustain a patent; and in *Roberts* v. *Ryer*, 91 U. S. 150, it was held that it *was no new invention to use an old machine for a new purpose*, and that the inventor of a machine was entitled to the benefit of all the uses to which it could be put, no matter whether he had conceived the idea of the use or not.

* * * * * * *

"The principle deducible from those cases is that it *is not a patentable invention to apply old and well-known devices and processes to new uses in other and analogous arts.* The decision in Ansonia Brass & Copper Co. *v.* Electrical Supply Co., *supra*, is very pertinent. In the opinion in that case the cases were reviewed which established (1) that the application of an old process or machine to a similar or analogous subject, with no change in the manner of application, and no result substantially distinct in its nature, will not sustain a patent, *even if the new form of result had not before been contemplated;* * * *"

In *Dreyfus* v. *Searle*, 124 U. S. 60, it was held:

"'* * * There was no patentable invention in applying to the heating of wine or any other liquor, from the inside of the cask, the apparatus which had been previously used *to heat another liquid in the same manner*. The case falls directly within the decisions of this court in *Pomace-Holder Co.* v. *Ferguson*, 119 U. S. 335, 338, 7 Sup. Ct. Rep. 382, and the cases there collected, and in *Heating Co.* v. *Burtis*, 121 U. S. 286, 7 Sup. Ct. Rep. 1034."

In *Morris* v. *McMillin*, 112 U. S. 244, it was held:

"The following cases illustrate the grounds upon which we base this conclusion: It was said by Mr. Justice Bradley, in delivering the judgment of this court in *Atlantic Works* v. *Brady*, 107 U. S. 192, S. C. 2 Sup. Ct. Rep. 225: 'The process of development in manufactures creates a constant demand for new appliances which the skill of ordinary head-workmen and engineers is generally adequate to devise, and which, indeed, are the natural and proper outgrowth of such development. Each step forward prepares the way for the next, and each is usually taken by spontaneous trials and attempts in a hundred different directions. To grant to a single party a monopoly of every slight advance made, except where the exercise of invention somewhat above ordinary mechanical or engineering skill is distinctly shown, is unjust in principle and injurious in its consequences.' In the case of *Pennsylvania R. Co.* v. *Locomotive Truck Works*, 110 U. S. 490, S. C. 4 Sup. Ct. Rep. 220, Mr. Justice Gray, speaking for the court, declared it to be the result of the decisions of the court that 'the application of an old process or machine to a similar or analogous subject, with no change in the manner of application and no result substantially distinct in its nature, will not sustain a patent, even if the new

> form of result has not been before contemplated.' In *Hailes* v. *Van Wormer*, 20 Wall. 353, where the patentee had taken a fire-pot from one stove, a flue from another, and a coal reservoir from the third, and had put them into a new stove, where each fulfilled the office it had fulfilled in its old situation, and nothing more, the patent was held void for want of invention. * * *'"

In *Grinnell Co.* v. *Johnson Co.*, 247 U. S. 426, it was held:

> "In *Specialty Manufacturing Company* v. *Fenton Metallic Manufacturing Co.*, 174 U. S. 492, 498, 19 Sup. Ct. 641, 643 (43 L. Ed. 1058), the rule was again tersely stated:
>
> "'Where a combination of old devices produces a new result such combination is doubtless patentable, but where the combination is not only of old elements, *but of old results, and no new function is evolved from such combination*, it falls within the ruling of this court in *Hailes* v. *Van Wormer*, 20 Wall. 353, 368 (22 L. Ed. 241); *Reckendorfer* v. *Faber*, 92 U. S. 347, 356 (23 L. Ed. 719); *Phillips* v. *Detroit*, 111 U. S. 604 (4 Sup. Ct. 580, 28 L. Ed. 532); *Brinkerhoff* v. *Aloe*, 146 U. S. 515, 517 (13 Sup. Ct. 221, 36 L. Ed. 1068); *Palmer* v. *Corning*, 156 U. S. 342, 345 (15 Sup. Ct. 381, 39 L. Ed. 445); *Richards* v. *Chase Elevator Co.*, 158 U. S. 299 (15 Sup. Ct. 831, 39 L. Ed. 991).'"

As to changes in sizes of pipes:

In *Clark Pomace Co.* v. *Ferguson*, 119 U. S. 335, it was held:

> "The only point of the invention would seem to be the use of a guide-frame smaller than the rack, or, in other words, the use of a rack larger than the guide-frame. *There was no invention in making the guide-frame or the rack of the desired size.*"

As to invalidation by introduction of new matter:

In *Lopulco Systems* v. *Bonnot Co.*, 24 Fed. (2) 510, the patent was held to be invalid for new matter exactly as in the case at bar (citing *Railway* v. *Sayles*, 97 U. S. 563; *Corbin Co.* v. *Eagle Co.*, 150 U. S. 43).

In *General Electric Co.* v. *Sangamo Co.*, 174 Fed. 251, it was held:

> "* * * A reading of Cox's original application discloses either that Cox did not discern that there was a deficiency in existing meters other than that produced by the variation of the plate by temperature, he did not know the means of overcoming them; or (and this probably is the fact), discerning that the disk was varied by causes other than temperature, and knowing the means of overcoming them, he did not regard either the discernment of the deficiency or the perception of the means as something that was new; for, had he regarded such discernment of the deficiency, and such perception of means, as something new, he would have embodied them in his application and original claims.
> * * * * * * *
> * * * and, *of course, such conception after the reading of Lanphier's application would be anticipated by the Lanphier disclosures;* so that there is nothing in the record before us showing that Cox anticipated Lanphier in either one of the two acts constituting invention, so far as either of those acts relate to the variation of the disc produced by causes other than temperature. *The claim of the Cox patent to this extent, therefore, are invalid.*"

As to introduction of new matter:

In *Michigan Central R. Co.* v. *Consolidated Car-Heating Co.*, 67 Fed. 121, the Court of Appeals for the Sixth Circuit (JJ. TAFT, LURTON and SEVERENS) held:

"The leading case upon this subject is that of *Railway Co.* v. *Sayles*, 97 U. S. 554.

* * * * * * *

And it was said by Mr. Justice Bradley, delivering the opinion of the court, that, if the amended application and model embodied any material addition to or variance from the original,—anything that was not comprised in that,—such addition or variance could not be sustained on the original application:

" 'The law does not permit such enlargements of an original specification, which would interfere with other inventors who have entered the field in the meantime, any more than it does in the case of reissues of patents previously granted. Courts should regard with jealousy and disfavor any attempts to enlarge the scope of an application once filed, or of a patent once granted, the effect of which would be to enable the patentee to appropriate other inventions made prior to such alteration, or to appropriate that which has in the meantime gone into public use.'

"In that case five years elapsed after the application was filed before the amendment was made. In this case a much less period intervened, but the length of time is not a controlling consideration, as is shown in the cases hereafter to be referred to.

"It will be seen from the opinion in *Railway Co.* v *Sayles* that the objection to new matter brought in by amendment of the specifications stands upon the same ground as when it is introduced upon a reissue, and in respect to the latter the statute declares that it shall not be done. Rev. St., par. 4916."

It is submitted that the McMichael patent is entirely invalid (1) in view of the prior art considered alone; (2)

in view of the prior art in the light of the *Concrete Appliance Co.* v. *Gomery* decision of this Court; (3) by reason of the introduction of new matter into the application in 1911; (4) in view of prior uses proved in this case; and (5) in view of prior uses proved in the companion case No. 528.

It is respectfully prayed, therefore, that the bill be dismissed with costs to the defendants.

Respectfully submitted,

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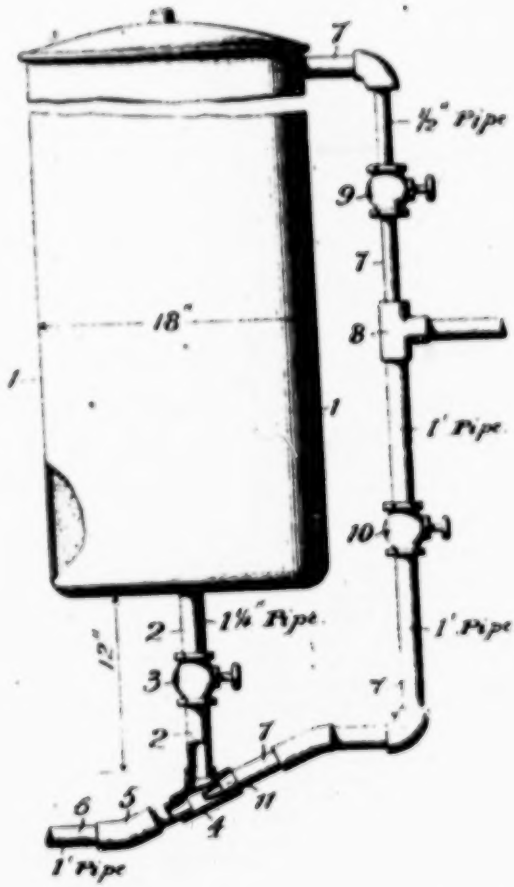
No. 747,396. PATENTED DEC. 22, 1903.

H. FARNHAM.

SAND BLAST APPARATUS.

APPLICATION FILED APR. 10, 1903.

NO MODEL.



WITNESSES

Jas. E. Hutchinson.

H. C. Parker.

INVENTOR

Henl Farnham

by H. C. Parker, Atty.

No. 747,396. Patented December 22, 1903.

UNITED STATES PATENT OFFICE.

NEAL FARNHAM, OF CHICAGO, ILLINOIS.

SAND-BLAST APPARATU.

SPECIFICATION forming part of Letters Patent No. 747,396, dated December 22, 1903.

Application filed April 10, 1903. Serial No. 151,998. (No model.)

To all whom it may concern:

Be it known that I, NEAL FARNHAM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sand-Blast Apparatus; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the figures of reference marked thereon, which forms a part of this specification.

My invention relates to a sand-blast apparatus; and it has for its object to produce such an apparatus in which the sand will pass from the reservoir or tank by gravity alone or by gravity aided by compressed air within the reservoir under regulation, the sand passing from the tank through a delivery-pipe leading to a blast-pipe provided with a blast nozzle or jet whose point of discharge is substantially beneath the discharge of the delivery-pipe into the blast-pipe, so as to prevent any backflow of air from the sand-carrying pipe or hose into the delivery-pipe and at the same time permitting the air-blast from the blast-nozzle to impact against the sand as it flows from the discharge-pipe, so as to drive it through the sand-carrying hose to the point of its application.

It has, further, for its purpose to provide a coupling between the vertical discharge-pipe leading from the sand-tank, the sand-carrying hose, and the air-blast-supply pipe, arranged so that the coupling will stand at an oblique angle to the longitudinal axis of the discharge-pipe, whereby the air-blast will be projected at an oblique angle across the discharge-mouth of the vertical discharge-pipe, the purpose of the first and second stated objects being to facilitate the freer passage of the sand from the tank through the discharge and into the sand-carrying hose and without clogging of the sand at either end of the discharge-pipe, which otherwise would be liable to occur by reason of back pressure of air in the discharge-pipe and condensation of moisture in the air-blast.

To the accomplishment of the foregoing and such other objects as may hereinafter appear the invention consists in the construction and in the arrangement of parts hereinafter particularly described and then sought to be clearly defined by the claims, reference being had to the accompanying drawing, forming a part hereof, and in which the figure is a side elevation of a sand-tank having my invention applied, a portion of the upper part of the tank being broken away.

In the drawing the numeral 1 designates a tank of any suitable configuration and dimensions designed to hold the sand. From the bottom of the tank leads a discharge-pipe 2, provided with suitable valves or valve 3 to regulate the flow of sand through the pipe. To the lower end of the discharge-pipe is attached a Y-coupling 4, which is inclined to the pipe 2 and, as shown, stands obliquely or at an angle of about forty-five degrees, more or less, to the longitudinal axis of the discharge-pipe. To one end of this coupling is attached, by a nipple 5 or otherwise, a sand-carrying hose 6 of any desired length to lead to the point of application of the sand-blast, which hose may be of pliable material or of rigid material provided with any desired number of flexible joints 6. To the other end of the coupling is connected an air-blast pipe 7, to which compressed air is supplied through a T or other coupling 8 from a suitable source of supply. The other end of the pipe 7 opens into the upper part of the tank 1, and said pipe is provided with a valve 9, by which the supply of air to the tank may be regulated or entirely cut off, and it is also provided with a valve 10, by which the supply of compressed air to the blast-nozzle may be controlled. At the point where the air-blast pipe 7 connects with the inclined coupling 4 it is provided with a nozzle or jet 11, which enters the coupling, so that its point of discharge will lie below the discharge-mouth of the discharge-pipe 2, leading from the tank, the best results being obtained when its point of discharge is about midway of the discharge-mouth of the discharge-pipe. By thus positioning the air-blast nozzle the air is projected across the mouth of the discharge-pipe 2 without the blast passing up into the discharge-pipe and at the same time creates a suction across the discharge-pipe and down through the same, so that the downflow of the sand through the

pipe is greatly facilitated. At the same time the force of the air-blast from the nozzle across the mouth of the discharge-pipe strikes the sand as it issues from the mouth of the pipe and propels it with velocity away from the pipe and through the carrying-hose and prevents any backflow or back pressure from the hose or coupling and into the discharge-pipe. If this back pressure were permitted, it would not only retard the downflow of the sand, but it would also result in the sand becoming moist from condensation of the compressed air, and thus the pipe would become clogged and the efficient working of the device interfered with. The inclination of the coupling at the lower end of the discharge-pipe also aids in the rapid flow of the sand from the mouth of the discharge-pipe, so as to aid in preventing backflow or back pressure of air.

By adjustment of the valve 9 more or less pressure of air may be admitted to the tank to assist the outflow of sand therefrom and its outflow regulated to a nicety, or the air may be entirely cut off from the tank.

The tank may be supported from the ground upon any suitable stand or otherwise supported.

I have indicated on the drawing the preferred dimensions of the parts; but they may be varied within reasonable limits.

Having described my invention and set forth its merits, what I claim is—

1. A sand-blast apparatus comprising the tank, the discharge-pipe leading from it, the compressed-air-supply pipe, sand-carrying hose, and the air-blast nozzle having its point of discharge beneath the mouth of the discharge-pipe leading from the tank, substantially as described.

2. A sand-blast apparatus comprising the tank, the discharge-pipe leading from it, the inclined coupling at the lower end of the discharge-pipe, the compressed-air-supply pipe, the sand-carrying hose, and the air-blast nozzle entering the inclined coupling and having its point of discharge beneath the mouth of the discharge-pipe leading from the tank, substantially as described.

3. A sand-blast apparatus comprising the tank, the discharge-pipe leading from it, the sand-carrying hose, the compressed-air-supply pipe opening into the upper part of the tank and having the upper and lower controlling-valves, the inclined coupling between the sand-carrying hose, the compressed-air-supply pipe and the discharge-pipe from the tank, and the air-blast nozzle having its point of discharge in the inclined coupling beneath the mouth of the discharge-pipe from the tank, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

NEAL FARNHAM.

Witnesses:
W. G. HENDERSON,
GEO. W. [illegible].

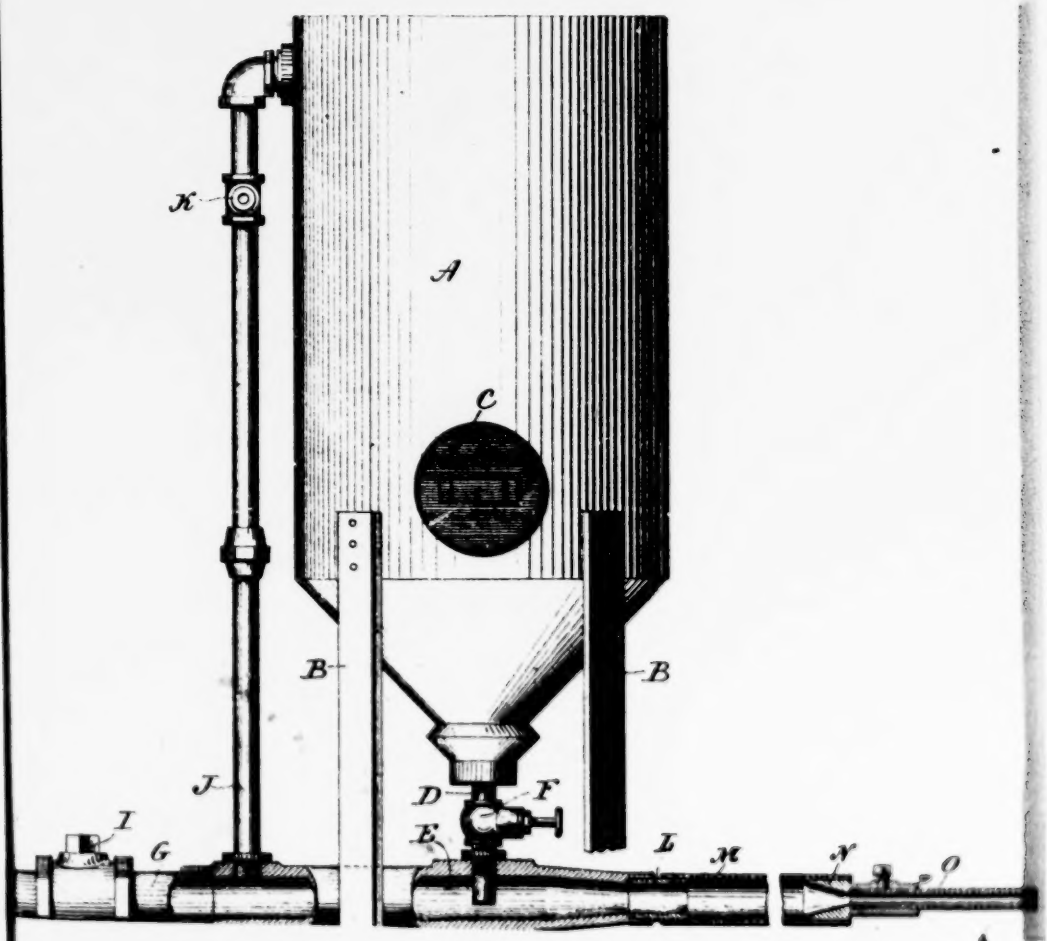
No. 671,303. Patented Apr. 2, 1901.

A. G. WARREN.

MIXER FOR SAND BLAST APPARATUS.

(Application filed May 26, 1900.)

(No Model.)



UNITED STATES PATENT OFFICE.

AMBROSE G. WARREN, OF HOLYOKE, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO J. W. PAXSON COMPANY, OF PHILADELPHIA, PENNSYLVANIA.

MIXER FOR SAND-BLAST APPARATUS.

SPECIFICATION forming part of Letters Patent No. 671,303, dated April 2, 1901.

Application filed May 26, 1900. Serial No. 18,040. (No model.)

To all whom it may concern:

Be it known that I, AMBROSE G. WARREN, of Holyoke, in the county of Hampden and State of Massachusetts, have invented a new Improvement in Mixers for Sand-Blast Apparatus; and I do hereby declare the following, when taken in connection with the accompanying drawing and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawing constitutes part of this specification, and represents a side view, partially in section, of a mixer for sand-blast apparatus constructed in accordance with my invention.

This invention relates to an improvement in mixers for sand-blast apparatus, and particularly for the device for mixing the sand with air and conducting it to the point where it is to be discharged, the object of the invention being a simple arrangement of mechanism whereby the sand from the reservoir or hopper may be discharged into the blast of air; and it consists in the construction as hereinafter described, and particularly recited in the claim.

As herein shown, the device consists of a reservoir or hopper A, preferably cylindrical, with a tapered or conical lower end and substantially air-tight. This reservoir is supported with its conical end downward by suitable legs or braces B. In one side is a hand-hole which is adapted to be tightly closed by a cap C in any suitable manner, and, if desired, a similar hand or filling hole may be formed in the top of the hopper. Coupled with the lower end of the hopper is a discharge-pipe D, which opens into a cylindrical chamber E and extends downward therein to a point preferably just below the horizontal center. In this pipe D is a valve F, of any preferred form, which is adapted to open or close the discharge through the pipe. The chamber E is adapted at one end to be coupled with a pipe G from the receiver or source of supply. Preferably this chamber will also be formed with a foot or base H, which will assist in supporting it. In the supply-pipe G is a valve I, of ordinary construction, and adjacent to the valve is an outlet into a pipe J for the passage of air into the top of the hopper, and preferably this pipe will be provided with a cut-off valve K. At the opposite end the mixing-chamber is reduced in diameter and is internally threaded for connection with a coupling-sleeve L, over which a flexible hose or tube M may be passed. This tube is of any desired length, and in its opposite end a nipple N is inserted, the opening through the nipple contracted, and its outer end adapted to receive a discharge-nozzle O.

The operation of the device is as follows: Air is admitted through the pipe G into the chamber E, and the valve F being open permits sand to pass from the hopper through the pipe D into the chamber and into the blast of air, with which it mingles and by which it is carried through the chamber into the flexible tube M and discharged through the nozzle O. If necessary to maintain a proper pressure and so as to cause the sand to feed, the valve K may be opened to permit a portion of the air to enter the top of the hopper and so as to force it through the discharge-opening at the bottom.

It is evident that instead of having the pipe J open out of the chamber it may lead from the receiver direct or from any part of the conducting-pipe to the mixing-chamber.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a mixer for sand-blast apparatus, the combination of a hopper contracted at its lower end, a mixing-chamber below said hopper, a pipe opening from the lower end of the hopper and extending into said chamber to a point below the longitudinal center thereof, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

AMBROSE G. WARREN.

Witnesses:
EUGENE W. KING,
CHARLES C. FORD.

No. 707,840. Patented Aug. 26, 1902.

W. GOLDIE.

METHOD OF BALLASTING RAILWAY TRACKS.

Application filed Jan. 10, 1902.

Fig. 1

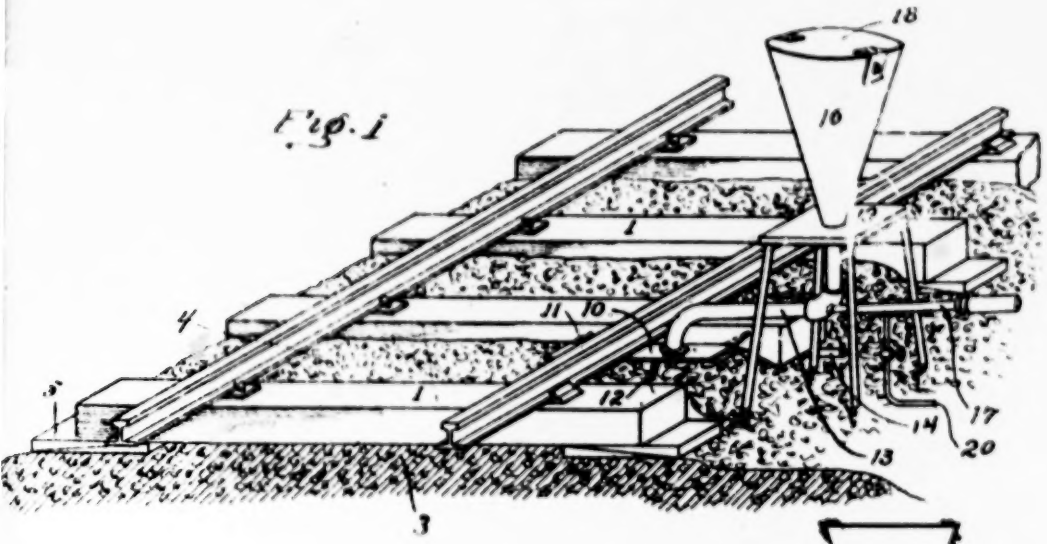


Fig. 2

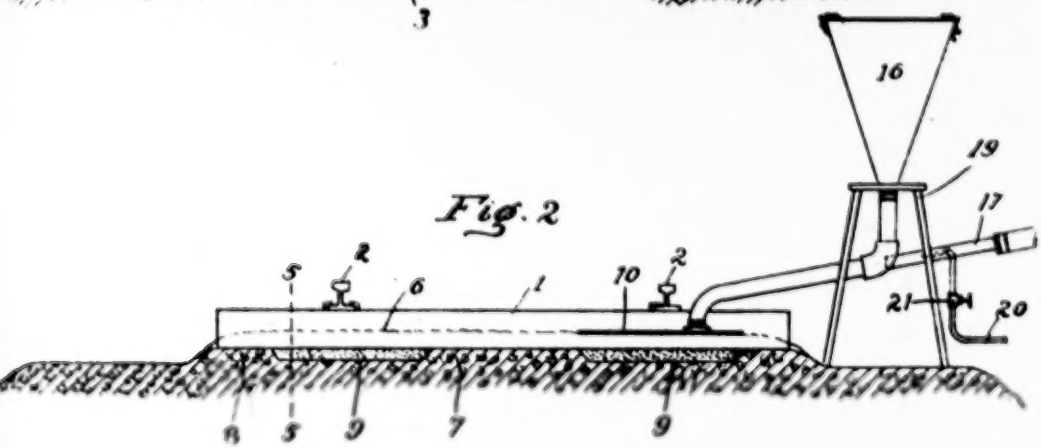


Fig. 3

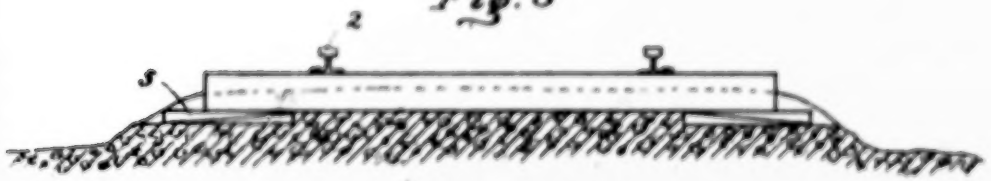


Fig. 4

Witnesses.
Fred D. Sweet.
[illegible]

Inventor.
William Goldie
By Kay & Totten
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM GOLDIE, OF WILKINSBURG, PENNSYLVANIA.

METHOD OF BALLASTING RAILWAY-TRACKS.

SPECIFICATION forming part of Letters Patent No. 707,840, dated August 26, 1902.

Application filed January 10, 1902. Serial No. 88,147. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of Ballasting Railway-Tracks; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the surfacing of railroad-tracks; and its object is to provide a method for bringing the tracks to and holding them at a proper surface without the necessity of tamping, which is the main means now employed on the ordinary steam-railroads for such purposes.

In a patent granted to me June 11, 1901, No. 676,128, is described at length the method of constructing and ballasting ordinary steam-railroad tracks and the causes which make it necessary to surface said tracks, all of which need not be repeated here. Suffice it to say that the ordinary way of surfacing a track consists in raising the deflected ties slightly by means of jacks and then packing or tamping the ballast under them by means of shovels or tamping-tools. As stated in said patent, this method of surfacing tracks is objectionable, because it is liable to disturb the solid bed of ballast under the tie formed by the weight of the trains, and after the surfacing has been accomplished in this manner the track necessarily rests on a fresh portion of gravel or stone, which is liable again to pack and sink under the weight of the trains, so that repeated surfacing of the track is necessary to maintain it in good condition. In said patent is also described and claimed a method of surfacing railroad-tracks whereby these objections are overcome, said method consisting, briefly stated, in injecting under the ties and upon the permanent solid bed formed thereunder cement in a plastic state, by the setting or hardening of which a solid support for the tie is formed. In carrying out this method in order to inject the plastic cement under the ties it is necessary that the latter be of such a consistency that it will flow readily, and by reason of the fluidity thereof it may happen that a train passing over the track before this plastic mass has set or hardened will force the same from under the tie, thereby leaving the latter without a proper support.

It is the object of the present invention to overcome this possible defect in the method described in my patent aforesaid, and the said invention is an improvement upon said method; and it consists, generally stated, in injecting the cement or similar material under the tie in a practically dry state and simultaneously imparting thereto sufficient moisture to insure the setting of the cement, but not sufficient to render the same plastic or fluid, so that after having been packed solidly under the tie it cannot become displaced by a passing train, but will remain in that position and set or harden by reason of the moisture imparted thereto.

The invention also includes certain other improvements, such as raising the track, supporting alternate ties while injecting the cement under the unsupported ones, and then subsequently treating the supported ties, placing dam-plates at the sides of the ties to confine the cement, and, if necessary, tamping at the sides of the ties near the end before injecting the cement in order to confine the flow of the latter, moistening the cement by means of a spray of atomized water, and other improvements which will hereinafter be particularly set forth and claimed.

In the accompanying drawings, Figure 1 is a perspective view of a track, illustrating the method of surfacing the same. Fig. 2 is a side view of the necessary apparatus and a cross-sectional view of the track. Fig. 3 is a cross-section of the track, illustrating means for supporting the ties; and Fig. 4 is a longitudinal section of the track on the line 5 5, Fig. 2.

In carrying out the invention I may employ any suitable quick-setting cement, such as Portland cement or cement of like character, the purpose being to provide solid interposed beds between the ties and the ballast-beds on which the ties have been seated, which will conform substantially to both the ballast-bed and the lower surface of the tie. The cement may be and preferably is mixed with sand or similar material, and the term "cement" as used in the specification and claims is therefore to be understood as including not only such cement when used alone, but also when used with sand, lime, or even fine gravel or other material. This cement is to be injected either mechanically or under fluid-pressure, preferably the latter, under the ties and substantially in a dry state,

being, however, slightly moistened either simultaneously or before or after it is inserted, so that it will set quickly to form a solid bed, but not sufficiently to render it so plastic or mobile that it can be forced from under the ties by the weight of a passing train before it has become set. By "injecting the cement under the tie" I mean forcing the same thereunder by means of a constant or uniform pressure, such as compressed air or steam or even mechanical means, to cause a stream of the material to flow under the tie without disturbing the underlying compacted bed of ballast and without the necessity of tamping, which latter is to be avoided, since it disturbs said solid bed of ballast previously formed under the tie.

For the practice of my invention I may employ any suitable apparatus, the drawings showing very simple apparatus suitable for the purpose; but it will be understood that the invention is not limited in this particular.

The invention is illustrated as forming cement bodies or beds near the ends of the ties underneath the rails, leaving the central portion of the ties supported merely upon the ballast, so as to prevent center binding.

The ties 1 shown are the ordinary wooden ones, although the invention may be employed with metallic ties, if desired or necessary. The rails 2 are generally located from fifteen to eighteen inches from the ends of the ties, and the purpose of the invention is to form a cement support under the rails, so as to give a direct support thereto. The ties rest upon the usual ballast-bed 3, and the ballast is filled in between the tracks, as at 4, which ballast extends up toward or to the tops of the ties. Any suitable mechanical support for bringing the track to the desired level at different points may be employed, such as the shims or wedges 5, which may be placed under the ends of the ties, as shown in Figs. 1 and 3, or may be placed between the ties and the rails, as shown and described in the patent above referred to. These shims are simply two tapering pieces of wood, one being inserted under the tie and the other being driven between it and the tie or the ballast-bed, thereby raising the tie and giving a sufficiently-strong support to sustain the track while the cement beds are being formed under the ties. In place of these shims ordinary lifting-jacks or other means may be employed, and said jacks may of course be used to raise the track to permit the placing of the shims 5 thereunder. These shims or other means are inserted under the ends of any suitable number of ties to give the temporary support to the track, and the cement beds are then formed under the other ties. The ballast 4 between the ties forms side walls to confine the space under each tie, and thereby confine the flow of the cement; but if this is not sufficient the operator will, after the tie has been raised and supported on the shims, tamp the ballast in at the sides of the tie near the end thereof, as at 6, and also on the inside of the rail, as at 7, and will also tamp the same under the outer end of the tie, as at 8, thereby leaving a space or chamber 9 underneath the tie under the rail, which space is to be filled with the cement. The tamping in of the ballast at the points 6, 7, and 8 will to a great extent confine the flow of the cement. The workman will then place at the side of the tie at the surface of the ballast 4, underneath the rail, the dam-plate 10, thereby forming a dam to prevent the cement from flowing backwardly from under the tie. This dam-plate is simply a metal plate of the proper width and length and is provided with a sharpened edge or, better still, with prongs 11, which is or are driven into the side of the tie to hold the plate in place. The dam-plate is also provided with a nippled opening 12, to which is secured the outer end of a hose or pipe 13, leading from the injecting apparatus. If necessary or desired, a similar dam-plate, but without the nippled opening 12, may be placed on the opposite side of the tie to prevent the cement from being forced out at said opposite side. It is also desirable to insert under the end of the tie and into the chamber 9 a drainage mold-bar 14, which is merely a long bar inserted under the tie for a greater distance than the cement bed is to be formed, so as to insure the formation of a drainage-canal 15 for conducting away any water that may collect under the middle of the tie, thereby preventing rotting of the latter.

The apparatus illustrated in the drawings for injecting the cement consists of the injector pipe or hose 13, connected to the nippled opening of the plate 10 or otherwise suitably projecting into the chamber or space 9 under the tie, a funnel or other suitable vessel 16 communicating with said pipe or hose, and a suitable source of fluid-pressure, such as the steam-pipe 17. The funnel 16 is provided with a cover 18, whereby it may be securely closed, and it may be supported upon any suitable platform, truck, car, or other support, the drawings merely showing a stand 19 for this purpose, which stand, however, is merely diagrammatic. The fluid-pressure for forcing the material under the tie may be either air or steam; but as the latter is the easier to generate I prefer to use the same. The injector pipe or hose 13 has a bend or elbow 21 just below the funnel 16, and the steam-pipe 17 projects into the injector pipe or hose 13 at this bend and has its end lying below the opening from the funnel 16, so that the steam will act on the principle of an ordinary injector and draw the cement out of the funnel 16 and force it through the hose or pipe 13 down underneath the tie. Any suitable means may be used for slightly moistening the said cement as it is forced under the tie; but I prefer to introduce a small water-pipe 20 into the steam-pipe, as shown, so that the flow of the steam or other fluid-

pressure will draw a fine stream of water into the pipe 17 and at the same time atomize it and thoroughly mingle it with the cement as the latter is forced by the fluid-pressure under the tie.

In carrying out the method the cement or the mixed cement and sand or gravel are placed in a dry state in the funnel 16. The cover 18 is closed down, and after the apparatus has been properly connected to the dam-plate 10 fluid-pressure, such as steam, is admitted through the pipe 17, the valve 21 in the water-pipe being opened. The flow of the steam or other pressure draws a stream of water through the pipe 20, atomizes the same, forces the same out at the end of the steam-pipe 17, and simultaneously draws the dry cement and other material down out of the funnel 16, mixing it with the atomized water and forcing the mixed mass through the pipe 13 into the space or chamber 9 underneath the tie. The cement is thus injected in a slightly-moistened condition between the tie and the solid ballast-bed 3, spreading out under the same and being confined by the dam-plates and the walls or sides of the ballast 4 between the ties, thereby completely filling such space and conforming to the ballast-bed 3 and the bottom and sides of the tie, so forming a solid interposed bed underneath the tie which gives support to the tie for its full width and conforms substantially to the under face of the tie and to the top face of the ballast. The fluid-pressure is maintained until the entire space under the tie is filled with a solid mass of very slightly moistened cement, which mass is not sufficiently fluid to be displaced by a passing train, but which contains sufficient moisture to rapidly set. The apparatus is then disconnected, the dam-plates 10 and molding-bar 14 removed, and the method repeated on other ties. After all of the unsupported ties have been thus treated and the cement has set the shims 5 are removed from the alternate ties, and they in turn are treated in the manner above described.

In the use of the invention the regular solid compacted beds of ballast under the ties formed by the weight of the passing trains are not in any way disturbed, but instead of that a solid support conforming to any irregularities in such ballast-bed on the under face of the tie is provided, this bed being of the full width of the tie and giving a broad solid support thereto. The main difficulties due to tamping ballast under the ties are overcome, and at the same time the tracks can be kept in continuous use, the cement mass forced under the ties being of such consistency that it cannot be displaced by the weight of the passing train, but such mass nevertheless containing sufficient moisture to set and form solid beds. The cement intermingles with sand or gravel ballast and forms a mass having irregular surfaces, so that it is free from the objection of ordinary sand or gravel ballast, in that the passing trains suck in under the smooth ties and force out sand, thereby rendering travel disagreeable and gradually carrying off and loosening the ballast and making resurfacing necessary.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method of surfacing railroad-tracks, consisting in injecting cement under the ties to form supporting-beds therefor, said cement being moistened sufficiently to cause the same to set but not sufficiently to render the same fluid or mobile.

2. The method of surfacing railroad-tracks, consisting in injecting cement under the ties to form supporting-beds therefor, and simultaneously therewith supplying sufficient moisture thereto to cause the same to set but not to become fluid or mobile.

3. The method of surfacing railroad-tracks, consisting in injecting cement under the ties to form supporting-beds therefor, and simultaneously therewith moistening the same with a spray of atomized water.

4. The method of surfacing railroad-tracks, consisting in raising the tie and then injecting cement under the same to form supporting-beds therefor, said cement being slightly moistened to cause the same to set but not sufficiently to cause the same to become fluid or mobile.

5. The method of surfacing railroad-tracks, consisting in tamping the ballast under the ends of the ties, and injecting cement under the ties underneath the rails to form supporting-beds therefor, said cement being moistened sufficiently to cause it to set but not sufficiently to cause it to flow or become plastic.

6. The method of surfacing railroad-tracks, consisting in placing dam-plates at the sides of the ties underneath the rails and injecting cement under the ties to form supporting-beds therefor, said cement being moistened sufficiently to cause it to set but not sufficiently to cause it to flow or become plastic.

7. The method of surfacing railroad-tracks, consisting in injecting under the ties by means of fluid-pressure cement to form supporting-beds therefor, and simultaneously therewith admitting a small stream of water to the fluid-pressure pipe whereby the water is atomized and mingled with the cement.

8. The method of surfacing railroad-tracks, which consists in injecting under the ties by means of fluid-pressure cement in a practically dry state, and simultaneously therewith drawing by means of said fluid-pressure a small stream of water into the fluid-pressure pipe whereby the water is atomized and mixed with the cement.

In testimony whereof I, the said WILLIAM GOLDIE, have hereunto set my hand.

WILLIAM GOLDIE.

Witnesses:
F. W. WINTER,
ROBERT C. TOTTEN.

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SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1930

No. 3

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK
Petitioners

against

CONCRETE MIXING AND CONVEYING COMPANY
Respondent

SUPPLEMENTAL BRIEF FOR PETITIONERS ON REARGUMENT

JOHN D. MORGAN
ALAN M. JOHNSON
Counsel for Petitioners

APPEAL PRINTING CO., 22 THAMES ST., NEW YORK CITY

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IN THE

Supreme Court of the United States

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, *Defendants-Petitioners,* v. CONCRETE MIXING AND CONVEYING COMPANY, *Plaintiff-Respondent.*	No. 3 October Term, 1930. Formerly No. 501. October Term, 1928.

SUPPLEMENTAL BRIEF FOR PETITIONERS ON REARGUMENT.

This case, now No. 3 (which came here from the Second Circuit), and its companion case, now No. 4 (which came from the Ninth Circuit), were argued before this Court as one case, on April 16, 1929. At that time the present case was No. 501, and the companion case from the Ninth Circuit was No. 528. Subsequent to the argument on April 16, 1929, this Court ordered these two cases to be restored to the calendar for reargument, and they are now before the Court pursuant to said order.

This is a supplemental brief in behalf of the defendants-petitioners from the Second Circuit.

It is respectfully requested that our main brief filed prior to the original argument be given full consideration at this time, the present brief taking up only supplemental matters, chiefly those arising out of the former argument. Such matters, therefore, will be discussed under suitable captions without prefatory matter, which latter is deemed non-essential.

I.

Patentee's Contradictory and Untenable Position on Testimony as to Prior Uses.

The patentee (who is respondent from the Second Circuit and is petitioner from the Ninth Circuit) is in an absolutely contradictory and untenable legal position on the question of the prior use testimony presented in the two records from the Second and Ninth Circuits, respectively. *The prior uses in evidence in the two records are entirely independent of each other, and relate to entirely different occurrences, persons and dates.*

Patentee is insisting here that, under the decisions of this Court, the findings of fact of the Second Circuit tribunals on that prior use testimony (which was favorable to the patent) be considered as "conclusive" and "unassailable," but patentee insists equally emphatically that the concurrent findings of fact of the Ninth Circuit tribunals, *which held the patent to be invalid because of prior use*, be considered *de novo* and reversed by this Court.

The only reason (so far as we can gather) for demanding this discriminatory treatment (*i. e.*, asking this Court to apply the law to the Second Circuit record, and to disregard it as to the Ninth Circuit record), is that the findings of fact on prior use in the Second Circuit record are favorable to the patent, and the concurrent findings of fact on the entirely different prior use by the Ninth Circuit tribunals are fatal to the patent. If there is any other "reason" why this rule of law should not be applied to the Ninth Circuit testimony, we are waiting to be enlightened.

To consider the entire matter more in detail:

I-a.

Concurrent Findings of Fact of Lower Courts are "Conclusive" and "Unassailable."

In patentee's brief as respondent from the Second Circuit, filed previous to the former argument, it is urged as to the Second Circuit prior use evidence (at p. 116 of the brief:

> "But the trial court, after hearing all the witnesses in open court, found that no prior use was shown (Opinion, R. 327), and that finding of fact is *conclusive*. *Adamson* v. *Gilliland*, 242 U. S. 350; 37 Sup. Ct. Rep. 169."

Again at pages 124 and 125 of its said brief, the patentee urges:

> "In *Adamson* v. *Gilliland*, 242 U. S. 350, 37 Sup. Ct. Rep. 169, 61 L. Ed. 356, this Court passed upon a situation very similar to the present one and said:
>
> "'Considering that a patent has been granted to the plaintiff, the case is pre-eminently one for the application of the practical rule that so far as the finding of the master or judge who saw the witnesses *"depends upon conflicting testimony or upon the credibility of witnesses, or so far as there is any testimony consistent with the finding, it must be treated as unassailable."*' Davis *v.* Schwartz, 155 U. S. 631, 636, 39 L. Ed. 289, 291, 15 Sup. Ct. Rep. 237."

If this rule of law, laid down by this Court, that the concurrent findings of fact of the lower tribunals are "conclusive" (Adamson *v.* Gilliland, *supra*) and "unassailable" (Davis *v.* Schwartz, *supra*) governs in the Second Circuit, as so earnestly argued by the patentee, *it governs equally in the Ninth Circuit* where the findings of fact on prior use are fatal to the patent.

The findings of fact in the Ninth Circuit as to invalidity of the patent because of prior use, are as follows:

Judge BOURQUIN, the trial judge (R. Case No. 4, p. 619), held:

> "* * * but as between them, in its present aspect in McMichael it is the idea and method of Leake and not McMichael, in that prior to McMichael, Leake had conceived the idea *and in 1905 in New Orleans had publicly and successfully employed it in concrete building operations.*
>
> "For despite Leake's reluctance to testify against his assignee, the plaintiff, *the evidence in quality and quantity inspires confidence and constrains conviction of the truth of the fact and beyond reasonable doubt.*
>
> "Neither of them, however, is inventor of the thing. Before them, it was old in the art."

That is, it was old in *Smith*, 122, 498; *Canniff*, 873, 345; and *McIlvrid*, 958, 421 (R. 616; 23 F. [2] 133).

The Court of Appeals of the Ninth Circuit held (R. Case No. 4, pp. 670-673):

> "It is assigned as error that the trial court found that Leake had made the invention in issue prior to the date of McMichael's application. In the opinion of the trial court it is said, 'Prior to McMichael, Leake had conceived the idea and in *1905 in New Orleans had publicly and successfully employed it in concrete building operations,* for despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence, in quality and quantity, inspires confidence and constrains conviction of the truth of the fact, and beyond reasonable doubt.'
>
> * * * * * * *
>
> "As a witness for the appellee in the court below, Leake testified that he conceived the idea of moving concrete, as set forth in his application, about February 1, 1905, that he made a container in which

> to put the concrete and by the means of an air pipe extending therefrom shot it up on top of a power-house then being constructed in New Orleans, that *when the air pressure was applied, the concrete all went up and landed on there*, that later he built a commercial apparatus in Chicago and operated it in conveying dry cinders to the fifth floor of a building. *His testimony, together with his preliminary statement, carried the date of his invention back of that of McMichael and showed an actual reduction to practice by Leake as early as 1905. We find no ground for disturbing the trial court's conclusion.*"

This was not a perfunctory affirmation by the Appellate Court of the finding of fact by the District Judge "who saw and heard the witnesses." The correctness of that finding by the District Court was taken up on a specific assignment of error, and the opinion of the Circuit Court of Appeals intrinsically evidences a thorough reconsideration of the entire record as bearing on the prior use testimony. In support of this, we quote, immediately following, rather fully from the appellate opinion.

To aid in getting the full import of this exceedingly concise, comprehensive and well-considered passage, we have broken it into additional paragraphs and have interpolated sub-heads, and some comment, *but have copied the text of the opinion verbatim*, as follows:

> "It is assigned as error that the trial court found that Leake had made the invention in issue prior to the date of McMichael's application. In the opinion of the trial court it is said, 'Prior to McMichael, Leake had conceived the idea and in *1905 in New Orleans* had publicly and successfully employed it in concrete building operations, *for despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence, in quality and*

> *quantity, inspires confidence and constrains conviction of the truth of the fact, and beyond reasonable doubt.'"*

Leake's application disclosed the "invention" fully *before he ever knew of McMichael*:

> "The McMichael application was filed January 14, 1907, and *nine months later on October 7, 1907, was filed Leake's application,* which presents everything contained in the McMichael application with the exception of the U-bend. Leake said, 'The object of my invention is to provide a method and apparatus for preparing a concrete mixture and delivering it while in a plastic condition to the place where it is to be utilized. Another object of my invention is to move plastic concrete from one place to another by means of air pressure.'"

DECLARATION OF THE INTERFERENCE BY THE PATENT OFFICE:

> "On May 12, 1909, interference was declared between McMichael and Leake and Wm. W. Darley, who had applied for a patent on 'apparatus for handling ashes and other materials.' Leake and Darley each filed an affidavit setting forth their respective dates of conception and reduction to practice. Darley was dismissed from the interference as being found subsequent in time to the others."

Leake, in his preliminary statement, *before he had access to McMichael's application, or had knowledge of his dates,* made oath that he had *successfully practiced the invention in New Orleans in 1905*:

> "Leake's affidavit stated that he 'conceived the invention set forth in the declaration of interference on or about the 1st day of February, 1905, that he first made drawings of the invention on or about the 1st day of March, 1905, and first explained the invention to others on or about the 1st day of

> June, 1905, that he first embodied his invention in a full-sized machine which was completed on or about the 1st day of September, 1905, and that *on or about the 1st day of September, 1905, the said machine was first successfully operated in the City of New Orleans, and State of Louisiana*, and that he has since made and used other machines embodying the same invention.' Before the interference was declared it was represented on behalf of Leake's application that he had done a large amount of experimental work in connection with his invention. '*He has successfully moved concrete from the place where it is mixed to the place where it is to be used, by means of air pressure, using the apparatus disclosed in his application.*' Again it was said, 'He has given considerable time and thought to this matter and has actually constructed several plants where this is done. Their operation is highly successful and appears to be a decided improvement over previously known methods for handling plastic concrete.' "

In the interference, McMichael could have relatively easily and inexpensively taken testimony and proved priority, *were he indeed the prior inventor.* Instead of doing so, he paid Leake $6,000 for a paper "concession of priority":

> "The long period of inaction and silence on the part of McMichael, unexplained as it is, together with the payment to Leake *of so large a sum of money as $6,000* payable as it was in annual installments until March 1, 1920, is *strongly suggestive of the inference that McMichael recognized the priority of Leake's invention and could furnish no proof to the contrary.*"

The significance of this course of action is well stated by the Appellate Court as follows:

> "*But no showing was made or evidence offered to carry the McMichael invention farther back than the date of his application,* nor was any proceeding had in the Patent Office upon his application until 19 months thereafter when for a *consideration of $6,000 Leake assigned his application to McMichael's attorney,* who later assigned it to the appellant which had become also the owner of the McMichael application."

Prior inventors are not in the habit of *giving* $6,000 to *later* inventors.

Leake's testimony in this case *is in harmony with the entire record proceedings in the interference.* The appellate court justly attached great significance to the entire agreement of the statements in Leake's preliminary statement filed in 1909, before he saw McMichael's application, with the reluctant testimony which he gave for the defendant. On this point, the decision states:

> "As a witness for the appellee in the court below, Leake testified that he conceived the idea of moving concrete, as set forth in his application, about February 1, 1905, that he made a container in which to put the concrete and by the means of an air pipe extending therefrom shot it up on top of a power-house then being constructed in New Orleans, that *when the air pressure was applied, the concrete all went up and landed on there,* that later he built a commercial apparatus in Chicago and operated it in conveying dry cinders to the fifth floor of a building. *His testimony, together with his preliminary statement, carried the date of his invention back of that of McMichael and showed an actual reduction to practice by Leake as early as 1905. We find no ground for disturbing the trial court's conclusion.*"

It is of basic significance in this Ninth Circuit record (1) *that the testimony is entirely uncontradicted;* (2) is

in full accord with all the record evidence; and (3) *the Appellate Court upheld the Trial Judge on these findings in every respect.*

The various matters of record evidence referred to in the appellate opinion, just quoted and discussed, are identified under the following caption:

I-b.

Evidence on Which Trial Court and Court of Appeals of the Ninth Circuit Based Their Findings of Fact.

The evidence in the Record in Case No. 4 (formerly No. 528) on which the courts based their decision is as follows:

1. Testimony of Thomas Leake, Record, pages 578-608, inclusive:

   (A) His testimony that he had received $6,000 from the respondent for his application.

   (B) This evidence was not rebutted in any way.

   (C) He was a hostile witness.

2. File wrapper and contents of the Leake application (Books of Exhibits, pp. 333-453, inclusive).

3. Leake's patent No. 1,215,558 (Book of Exhibits, pp. 454-462).

4. Assignment by Leake to plaintiff's attorney for $6,000 (Book of Exhibits, pp. 469-479).

5. Leake's sketch Exhibit No. 127 (Book of Exhibits, p. 694).

I-c.

Authorities on This Point.

This doctrine as to the "conclusiveness" and "unassailability" of concurrent findings of fact has been repeatedly laid down by this Court over a very long period of years, and a few of the decisions will be briefly excerpted here.

In *Metsker* v. *Bonebrake*, 108 U. S. 66, 2 Sup. Ct. Rep. 351, 354, the Court held:

> "*The findings of the master are prima facie correct.* Only such matters of law and of facts as are brought before the Court by exceptions are to be considered, and the burden of sustaining the exception is on the objecting party. In the case before us we are inclined, after a careful examination of the testimony, to concur with the master's report. It is altogether a matter of the weight of evidence."

In *Tilghman* v. *Proctor*, 125 U. S. 136, 149, where the Court held:

> "We are then brought to a consideration of the exceptions taken to the master's report in matters of fact, affecting the accuracy of his conclusions in respect to the amount of those profits, gains and savings. In dealing with these exceptions, the conclusions of the master, depending upon the weighing of conflicting testimony, have every reasonable presumption in their favor, and are not to be set aside or modified unless there clearly appears to have been error or mistake on his part. Metsker *v.* Bonebrake, 108 U. S. 66; Donnell *v.* Columbian Ins. Co., 2 Sumner, 366, 371; Mason *v.* Crosby, 3 Woodb. & Min. 258, 269; Paddock *v.* Commercial Ins. Co., 104 Mass. 521, 531; Richards *v.* Todd, 127 Mass. 167, 172."

In *Kimberly* v. *Arms*, 129 U. S. 512, 9 Sup. Ct. Rep. 355, 360, the Court held:

> "We are therefore constrained to hold that the learned Court below failed to give to the findings of the master the weight to which they were entitled, and that they should have been treated as so far correct and binding as not to be disturbed unless clearly in conflict with the weight of the evidence upon which they were made."

In *Davis* v. *Schwartz*, 156 U. S. 631, 15 Sup. Ct. Rep. 237 (referred to and followed in *Adamson* v. *Gilliland*), the Court held:

> "1. As the case was referred by the court to a master to report, not the evidence merely, but the facts of the case, and his conclusions of law thereon, we think that his finding, so far as it involves questions of fact, is attended by a presumption of correctness similar to that in the case of a finding by a referee, the special verdict of a jury, the findings of a circuit court in a case tried by the court under Revised Statutes, Sec. 649, or in an admiralty cause appealed to this court. In neither of these cases is the finding absolutely conclusive, as if there be no testimony tending to support it; *but so far as it depends upon conflicting testimony, or upon the credibility of witnesses, or so far as there is any testimony consistent with the finding, it must be treated as unassailable.* Wiscart *v.* Dauchy, 3 Dall. 321; Bond *v.* Brown, 12 How. 254; Graham *v.* Bayne, 18 How. 60, 62; Norris *v.* Jackson, 9 Wall. 125; Insurance Co. *v.* Folsom, 18 Wall. 237, 249; The Abbotsford, 98 U. S. 440."

In *Adamson* v. *Gilliland*, 242 U. S. 350, 37 Sup. Ct. Rep. 169, 171, the Court held:

> "' • • • the case is pre-eminently one for the application of the practical rule that so far as the finding of the master or judge who saw the witnesses 'depends upon conflicting testimony or upon the credibility of witnesses, or so far as there is any

> testimony consistent with the finding, it must be treated as unassailable.' Davis *v.* Schwartz, 155 U. S. 631, 636, 39 L. Ed. 289, 291, 15 Sup. Ct. Rep. 237."

In *United States* v. *United Shoe Machinery Co.*, 247 U. S. 32, 38 Sup. Ct. Rep. 473, 475, a case in which there was a sharp conflict on the fact testimony (while in the present case the testimony is unrebutted) this Court held:

> "The contentions could not well be more antagonistic, upon each of which there was conflicting testimony and the important fact is to be borne in mind that it was given in open court (except as to certain contentions about patents, their scope and validity). The fact justifies deference to the findings of the trial court. Adamson *v.* Gilliland, 242 U. S. 350, 353, 37 Sup. Ct. Rep. 169, 61 L. Ed. 359."

In *Mason* v. *United States*, 260 U. S. 545, 43 Sup. Ct. Rep. 200, the Court held:

> "The Circuit Court of Appeals suggested doubts respecting the honesty of defendants' motives in seeking or in acting upon advice of counsel; but we cannot ignore the finding of the master explicitly to the effect that the locators proceeded in 'moral good faith.' *His finding was made after hearing and seeing the witnesses and, having support in the evidence, will be accepted here.* See Adamson *v.* Gilliland, 242 U. S. 350, 353, 37 Sup. Ct. Rep. 169, 61 L. Ed. 356."

We agree with opposing counsel as to what the law is, but insist that this rule be applied to *all* the findings of fact *in both records.*

If that is done, and we submit it must be done, on the authority of this Court over a period of fifty years, then the consideration of any other questions presented in the record is unnecessary. The patent in suit is invalid.

I-d.

Patentee's False Contention that Leake's Device Was An Abandoned Experiment.

The record is entirely against this contention of patentee. What the record actually shows is:

In 1905 Leake successfully reduced his invention to practice by pneumatically conveying concrete at New Orleans.

In October, 1907, Leake filed his application, covering not only his pneumatic concrete conveyor, which he successfully used in 1905, but also a very complete mixer coacting with the conveyor.

Between October, 1907, the date of filing of Leake's application, and May 18, 1909, when the interference with McMichael was declared, a period of about twenty months, Leake filed seven amendments and arguments in the Patent Office in seeking allowance of his application (9th Cir. R. 355-402, 463).

In May, 1909, he accepted the interference with McMichael's application, and continued to fight until McMichael paid him $6,000 for a concession of priority and an assignment of the application.

As we read this record it establishes continuous progressive activity, and unusual diligence, up to the very time when McMichael paid Leake the $6,000 for the assignment of his application and the paper "concession of priority."

Leake is far within the law on this subject, laid down in the following authorities:

In *Brush* v. *Condit*, 132 U. S. 39, 48, 49, this Court held:

> "'The case is that of the public, well-known, practical use in ordinary work, with as much success as was reasonable to expect at that stage in the development of the mechanism belonging to electric arc lighting, of the exact invention which

was subsequently made by the patentee; and, although only one clamp and one lamp were ever made, which were used together two and one-half months only, and the invention was then taken from the lamp and was not afterwards used with carbon pencils, it was an anticipation of the patented device, under the established rules upon the subject. With a strong disinclination to permit the remains of old experiments to destroy the pecuniary value of a patent for a useful and successful invention, and remembering that the defendants must assume a weighty burden of proof, I am of the opinion that the patentee's invention has been clearly proved to have been anticipated by that of Hayes. *Coffin* v. *Ogden*, 18 Wall. 120; *Reed* v. *Cutter*, 1 Story, 590; *Pickering* v. *McCullough*, 104 U. S. 310; Curtis on Patents, Secs. 89-92.

" 'The bill, so far as it relates to the clamp patent, is dismissed.'

"We have examined carefully the evidence in this case, relied upon by the plaintiffs to show that the clamp arrangement of Hayes was not a perfected invention, but was merely an abandoned experiment, and we have arrived at the conclusion that Judge SHIPMAN's views on the subject are correct. They are well and accurately expressed, and we could not add to their force by a prolonged discussion of what is purely a question of fact."

In *Gayler* v. *Wilder*, 10 How. 477, 498, the Court held:

"We do not understand the Circuit Court to have said that the omission of Conner to try the value of his safe by proper tests would deprive it of its priority; nor his omission to bring it into public use. He might have omitted both, and also abandoned its use, and been ignorant of the extent of its value; yet, if it was the same with Fitzgerald's, the latter would not upon such grounds be entitled to a patent, provided Conner's safe and its mode of construction were still in the memory of Conner before they were recalled by Fitzgerald's patent."

II.

McMichael Merely a Minor Improver in Art of Pneumatically Conveying Concrete.

The present is a typical case of a minor improvement patent being pushed, by most strenuous efforts of counsel, to appear as a pioneer patent.

Judge BOURQUIN, in his decision, 23 Fed. (2) 131, 133; R. p. 616, held on this point:

> "*Moreover, prior to McMichael were patents for appliances and methods to convey concrete by the agency of compressed air.* Amongst these are Smith, 122,498 of 1872, Cannif, 873,345 of 1906, and McIlvrid, 958,421 of 1905. In so far as it is argued that some of these are for grout, and will not function with less liquid concrete, the answer is they can be used for any practical flowable concrete, and they have been. They are of the simplicity of McMichael's, and even average intelligence will perceive their ability to operate successfully."

The Ninth Circuit Court of Appeals, in its decision, 27 Fed. (2) 838; R. pp. 668, 669 held:

> "Of the prior patents we find it necessary to refer particularly to but three, the *patent to Smith, No. 122,498*, of January 2, 1872, and the English patents to Duckham, one No. 4,400 of 1875, and one No. 15,348 of 1885. The Smith patent was for 'An improvement in the manufacture of concrete pavements and machinery for same.' The specifications described the apparatus as specially adapted to the manufacture and convection of *concrete* composition through pipes so as to set quickly upon reaching its destination and form a solid mass of artificial stone, *and uncontradicted testimony was given of the successful use of the Smith machine in conveying concrete through a*

> *pipe by compressed air.* The device contained all the features of the appellant's patent except the nozzle for admission of air near the point of exit."

We believe that no further argument is needed on the point that McMichael's was not a pioneer patent in pneumatically conveying concrete. This concurrent finding of the lower courts should be treated as "conclusive" (*Adamson* v. *Gilliland, supra*) and as "unassailable" (*Davis* v. *Schwartz, supra*).

Not only do the patents to Smith, No. 122,498; Cannif, No. 873,345; and McIlvrid, No. 958,421, disclose devices for pneumatically conveying concrete, *but they also clearly teach that practically any of the pneumatic conveying devices of the art can be used for pneumatically conveying or "blowing" practically any plastic, granular, particulate, or other fluent materials.* Smith patents 122,497 and 122,498 clearly disclose the use in such machines of *the modern liquid or fluent concrete.* The arrangement of the metal chamber, the curved delivery pipe, and *either* one or two air-blowing pipes, and the application of air both above and below, or either above or below the concrete or other material to be conveyed is old in numerous prior patents as pointed out in our main brief.

II-a.

Patentee's Contention that Smith Patent 122,498 is Inoperative Totally Conflicts With Record.

The patentee persists in the unfounded contention that this patent is inoperative. This contention is but an index of the recognition of the deadly character of this Smith patent No. 122,498 as anticipating and invalidating the patent in suit.

The utility (*i. e.*, operativeness) of every patent is presumed unless it is overcome by evidence.

In *Gandy* v. *Main Co.*, 143 U. S. 587, 595, the Court said:

> "The language of Mr. Justice Woods in delivering the opinion in *Lehnbeuter* v. *Holthaus*, 105 U. S. 94, 96, is equally pertinent to this branch of this case: 'The patent is *prima facie* evidence both of novelty and utility, and neither of these presumptions has been rebutted by the evidence. On the contrary, they are strengthened.'"

In *Dashiel* v. *Grosvenor*, 162 U. S. 425, 432, the Court said:

> "The very fact that a machine is patented, is some evidence of its operativeness, as well as of its utility, * * *"

In *Pickering* v. *McCullough*, 104 U. S. 310, 319, the Court held:

> "It is objected, however, that the machines described in these patents are mere paper machines, not capable of successful practical working. But on examination it sufficiently appears, we think, that the objections can be sustained only as to minor matters of detail in construction, not affecting the substance of the invention claimed, and could be removed by mere mechanical skill, without the exercise of the faculty of invention. In this view, the Wise and Smith patents are not rendered inefficient as defenses in this suit, by reason of the alleged imperfections of the machines described in them."

There was no testimony whatever offered even tending to show that the Smith patent 122,498 is in anywise inoperative.

Notwithstanding that there was no obligation on the Ninth Circuit defendant to do so, tests were made and testimony taken to prove the operativeness of the Smith patent.

II-a-1.

Successful Operation of Smith Device.

In its Second Circuit brief, at page 106, patentee contends:

> "8. The courts in the Ninth Circuit also erred in considering the test made *in camera* by the defendants of the alleged Smith 1872 apparatus, of importance, for the following reasons, among others:
>
> a. The test was made without the presence of anyone representing the plaintiff."

And much more to the same effect.

In reply to this we submit:

1. No objection was made at the trial to the testimony of Hackley (R. 429-431) or Wilkins (R. 447-453) that the Smith machine was operated successfully, nor to the admission in evidence of the replica of the machine of the Smith patent, which was successfully operated (Exhibit 185).

2. No assignment of error was based on the admission of the evidence of successful operation of Smith's machine, nor of the machine itself as Exhibit 185. See *Wood* v. *Wilbert*, 226 U. S. 384; *Camden* v. *Stuart*, 144 U. S. 104.

3. The record shows (R. 61-63) that patentee's counsel acknowledged notice given them by defendant's counsel of the making of the tests with the Smith machine and the invitation to be present at those tests.

4. No attempt was made by patentee to rebut the very conclusive evidence of the successful operation of the machine of the Smith patent.

It is too late for patentee in its brief before this Court to initially assail the admissibility of the evidence of the successful operation of the Smith machine.

II-a-2.

The findings of fact of the Ninth Circuit tribunals on the testimony concerning the successful operation of the Smith machine are as follows:

Judge BOURQUIN held (23 Fed. [2] 133) concerning the Smith and other patents:

> "They are of the simplicity of McMichael's, *and even average intelligence will perceive their ability to operate successfully.*"

The Court of Appeals (27 F. [2] 839) held:

> "The Smith patent was for 'An Improvement in the manufacture of concrete pavements and machinery for same.' The specifications described the apparatus as specially adapted to the manufacture and convection of *concrete* composition through pipes so as to set quickly upon reaching its destination and form a solid mass of artificial stone, *and uncontradicted testimony was given of the successful use* of the *Smith machine in conveying concrete through a pipe by compressed air.* The device contained all the features of the appellant's patent except the nozzle for admission of air near the point of exit."

These findings of fact as to the operativeness of the Smith patent in pneumatically conveying concrete should be regarded as "conclusive" and "unassailable" (*Adamson* v. *Gilliland*, and *Davis* v. *Schwartz*, *supra*).

In *Coffin* v. *Ogden*, 18 Wallace 120, 124, the Court held:

> "The invention or discovery relied upon as a defense, must have been complete, and capable of

producing the result sought to be accomplished; and this must be shown by the defendant. * * * *The prior knowledge and use by a single person is sufficient. The number is immaterial.*"

III.

McMichael Patent "A Nose of Wax."

"Some persons seem to suppose that a claim in a patent is like a nose of wax, which may be twisted and turned in any direction, by merely referring to the specification, so as to make it include something more than, or something different from, what its words express." *White* v. *Dunbar,* 119 U. S. 47; 7 S. Ct. Rep. 72, 74.

The McMichael "nose of wax" has been twisted in several directions. This twisting was in four stages, which will now be described.

Stage No. 1. The Alleged Invention of the McMichael Application as Filed in 1907.

The preamble to McMichael's application *as filed* stated:

"This invention relates to apparatus for elevating and transporting *granular and plastice material,* such as *sand, plaster, mortar and concrete*" (9th Cir. R. pp. 196, 197).

The significance of this statement lies in the truthful statement that the McMichael tank and pipes would pneumatically convey *either* granular material such as *sand,* or plastic material such as *mortar* or *concrete.*

The corollary of this is, that the prior patents (probably unknown to McMichael at that time) for pneumatically conveying granular material, and having almost identically the same structure, become admittedly anticipating prior art.

Statements of Patentee's Chief Engineer, Kirkland.

Kirkland, after six years, as chief engineer for the patentee, in supervising the installation of the McMichael devices and giving instruction in the use of them (2nd Cir. R. 104-112), in his address to the Western Society of Engineers stated (R. 108):

> "* * * these portions are *carried along in suspension much as dust is carried along in a storm,* * * * the air velocity in passing through the pipe is *sufficient to keep the materials in suspension,* and it is *important to have a sufficient air pressure to keep the materials in suspension,* * * *."

In that same address, Kirkland stated that he had actually used the McMichael patent device on the same day to pneumatically convey or "blow" concrete, a *plastic* material, and also a mixture of limestone screenings and sand, a *granular* material (Exhibit H, pp. 334-5), as follows:

> "The packing material consisted of a mixture of 75 per cent. limestone screenings and 25 per cent. sand. This was blown in, filling the cavity completely, and packing it tightly."

The purport of the foregoing is that Kirkland, patentee's chief engineer, in 1918 (before there was any litigation or any necessity to "put over" the patent), told the Western Society of Engineers that the McMichael device operates (1) upon either plastic *or* granular materials, exactly as stated in the specification *as filed* in 1907, and (2) exactly as do all the devices of the prior art which have the material containing chamber, the delivery pipe, and either one or two compressed air pipes, that is, it simply blows the material through the pipe. It is in effect a statement that the device does not operate on the "slug theory" (introduced illegally into the specification

in 1911) and which Judge BOURQUIN stated did "violence to the laws of nature and confounded reason."

The sum total of the foregoing was, in effect, the admission of the fact that McMichael in structure and method is identical with the prior art.

Under stress of litigation, Kirkland attempted to repudiate some of his statements to the Western Society of Engineers (2nd Cir. R. 103-110).

Stage No. 2. McMichael Specification Transformed in Patent Office.

In 1911 and 1913 (four and six years after filing) after all the claims had been repeatedly rejected on the prior patents above referred to, *and after access was had to the Leake specification*, the McMichael specification was rewritten as "a METHOD OF and an apparatus for transporting AND TREATING CONCRETE" (9th Cir. R. 197; 217-220; 224, *et seq.*).

This transformation involved the illegal insertion of new matter, thereby rendering the patent invalid. *Railway Co.* v. *Sayles*, 97 U. S. 554; *Michigan Central R. R.* v. *Consolidated Co.*, 67 Fed. 121. This matter is treated fully in our main brief.

Stage No. 3. The "Slug" Theory.

The slug theory made its appearance in the first litigation, as the third stage of twisting "the nose of wax," and it was persisted in until judicial decisions compelled its abandonment.

It first appeared in the testimony in the "Ulen suit" of Ray, the patent expert, and the concurring testimony of Kirkland, the chief engineer (the latter's testimony being in flat contradiction to his statement to the Western Society of Engineers).

The theory is discussed in our main brief.

The position of the patentee up to the time of the decision of Judge BOURQUIN, in the District Court at Seattle, is expressed in their brief (p. 4) before the Court of Appeals of the Second Circuit, as follows:

> "The operation of an apparatus made according to the patent and operated according to the method therein defined *produces the peculiar result of first pressing the concrete mass into the outlet and packing it there, then cutting off successive sub-masses or slugs at the outlet, and then propelling these masses or 'slugs' in quick succession through the delivery pipe to the distant point of placement.*"

Stage No. 4. The "Slug" Theory is Abandoned, and the "Velocity Nozzle" Theory is Substituted Before This Court.

This final twist in "the nose of wax" was caused by

(1) the decision of Judge BOURQUIN that the slug theory "would do violence to the laws of nature and confound reason. It cannot be done."

(2) the decision of the Ninth Circuit Court of Appeals (9th Cir. R. p. 675) that the slug theory was impossible and furthermore that it was not in McMichael's original application but years later was imported as illegal new matter from Leake's application.

(3) The Court of Appeals of the Second Circuit (2d Cir. R. p. 346) held:

> "Such statements necessarily forbid the notion of solid slugs."

IV.

Patentee Relies in This Court on a New Theory—the "Velocity-Nozzle."

In patentee's brief here from the Second Circuit (p. 97) the slug theory is expressly abandoned as a basis for attempting to hold alleged infringers.

Consequent upon the decisions of the several courts condemning the "slug" theory, the patentee has shifted position completely, and before this Court, asserts that the essential feature of the McMichael patent is the "velocity nozzle." See pages 75, *et seq.*, of patentee's Ninth Circuit brief. This new "velocity nozzle" theory is a total departure from the previous "slug theory." So long as the latter theory prospered in the courts, it was McMichael's invention. Now that it has been discredited and condemned by the Courts, it has been discarded by patentee (Patentee's 2d Circuit Brief, p. 97), and lo, the McMichael invention is the "velocity nozzle."

To realize the extent of this last twist to the McMichael "nose of wax," let us compare, in parallel, their contention here with their contention before the Second Circuit Court of Appeals.

Patentee's Brief (p. 4) 2d C. C. A.:

"The *operation of an apparatus made according to the patent and operated according to the method* therein defined produces the peculiar result of *first* pressing the concrete mass into the outlet and packing it there, *then cutting off successive sub-masses or slugs at the outlet*, and then

Patentee's Briefs in this Court:

(2d Circuit Brief, p. 97):

"Nor has the respondent ever contended that the slug method of operation was essential to infringement."

(9th Circuit Brief, p. 75):

"* * * the devices which were held to infringe in the *Ulen* and *Powers-Kennedy*

propelling these masses or 'slugs' in quick succession through the delivery pipe to the distant point of placement."

cases, employs a *velocity nozzle* * * *. Each would fail as a concrete placer if it were stripped of its velocity nozzle."

(After patentee's brief for the 2d Circuit Court of Appeals, just quoted from, was written, Judge BOURQUIN ruled that the "slug" theory "did violence to the laws of nature and confounded reason," and the two Circuit Courts of Appeals also condemned it.)

In *White* v. *Dunbar, supra*, this Court condemned this procedure, as follows:

> "The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; *and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms.*"

This is a flagrant case of the wax nose twisting totally condemned by this Court. *There is no more occasion for an honest patent to skulk, dodge or evade than there is for an honest man to do so.* Attempts to totally change the basic purport of a patent, as has been done by McMichael, are as unethical as changing boundary maps or moving monuments.

V.

Falsity of "Velocity Nozzle" Theory Proved by the Record.

Facing page 76 of patentee's Ninth Circuit brief is a diagram showing several pneumatic concrete conveying machines, and on page 76 is stated:

> "The devices shown in the lower row cannot successfully be used for placing concrete. Why? One sufficient reason why they cannot be so used, is because each and every of these prior art devices is without a velocity nozzle."

Among the alleged inoperative devices in the lower row in said diagram are those of Smith patent, 122,498; Canniff patent 873,345, Duckham British patents 4,400 of 1875 and 15,348 of 1885, and Kolsche German patent 18,394 of 1881.

Patentee's brief asserts, absolutely contrary to the record and decisions, that all these are inoperative. Let us see what the record and the decisions in this case say as to the operativeness of these devices:

Judge BOURQUIN held (R. 616):

> "Moreover, prior to McMichael were patents for appliances and methods to convey concrete by the agency of compressed air. Amongst these are Smith 122,498 of 1872, Cannif, 873,345 of 1906, and McIlvrid, 958,421 of 1905. In so far as it is argued that some of these are for grout, and will not function with less liquid concrete, the answer is they can be used for any practical flowable concrete, and they have been. They are of the simplicity of McMichael's, and even average intelligence will perceive their ability to operate successfully.
>
> "The variety of concrete is not material, save in respect to the mere incidentals of pressure and size of container, load, and discharge conduit. In any apparatus, including McMichael, the concrete must be flowable in quality, and the pressure in due proportion to the weight and friction of the load ahead of it. To suit these incidentals to circumstances is mechanical, and not invention."

The 9th C. C. A. held:

> "Of the prior patents we find it necessary to refer particularly to but three, the patent to Smith, No. 122,498, of January 2, 1872, and the English patents to Duckham, one No. 4,400 of 1875, and one No. 15,348 of 1885. The Smith patent was for 'an improvement in the manufacture of concrete pavements and machinery for same.' The specifications described the apparatus as specially adapted to the manufacture and convection of concrete composition through pipes so as to set quickly upon reaching its destination and form a solid mass of artificial stone, *and uncontradicted testimony was given of the successful use of the Smith machine in conveying concrete through a pipe by compressed air.* The device *contained all the features* of the appellant's patent except the nozzle for admission of air near the point of exit."

The uncontradicted testimony as to the actual operativeness of the Smith and Canniff devices is in the 9th Circuit record, and has been referred to elsewhere.

The evidence in the record establishing clearly that Smith 122,498, Canniff No. 873,345, and McIlvrid 958,421, have successfully conveyed concrete pneumatically, and the concurrent findings of fact of the Ninth Circuit courts to that effect, are conclusive proof that patentee's newfound contention that a velocity nozzle is necessary is absolutely without foundation. But were that contention true, McMichael did not invent the velocity nozzle for pneumatically conveying various materials. It is very old and widely used in the prior art.

VI.

"Velocity Nozzle" an Ancient and Common Device in Pneumatic Conveying.

Nothing is more common in the art of pneumatic conveying than a "velocity nozzle." The use of a nozzle of this kind to speed the passage of any material through a pipe will be absolutely obvious to every mechanical man. They have been in common use in the art of pneumatic conveyance of material through pipes for a half century. Their name is legion in patents relating to pneumatic conveying. Taking only the patents at hand in the present record, attention is called briefly to the following (italics ours):

No. 707,840 to Goldie (9th Cir. R. 513; Ulen R. "Exhibit D," p. 335; and in the back of our main brief). At page 516, this patent states:

> "The injector pipe or hose 13 has a bend or elbow 21 just below the funnel 16, and the *steam pipe 17 projects into the ejector pipe or hose 13* at this bend and has its end lying below the opening from the funnel 16, *so that the steam will act on the principle of an ordinary injector and draw the cement out of the funnel 16 and force it through the hose or pipe 13* down underneath the tie."

No. 408,201 to Wallace (2nd Cir. R. 309). The patent states at page 310:

> "The operation is as follows: When the valve H in the pipe G is open, steam is admitted from the boiler to the coil F in the furnace E, is superheated in the same to the required degree, and then passes through the pipe C into the discharge pipe A. *The velocity of the steam escaping from the nozzle C' creates a vacuum* in the discharge pipe A between the nozzle end and the closed end B."

No. 267,318 to Beach (2nd Cir. R. 305). This patent states (p. 306):

> "M is a discharge pipe leading to a helper, by means of which 'helper', so-called, a new impetus is given to the article or commodity to be transported."

Claim 6 of this patent (p. 308) reads:

> "The combination of the receivers K, K with the *discharge pipe M* and switch N, *discharging into the pipe G' into a current of air moving with great velocity through the pipe G'* from the point of ingress (for said air) and the reservoir A, the *renewing of the momentum first imparted by means of the helper or pipe G' through which a current of air is impelled at great velocity.*"

No. 609,744 to Hennig (9th Cir. R. 675). This patent states (p. 678):

> "Where the fuel feed is periodically interrupted, *I prefer to supplement the action of the pressure behind the fuel by a stream of air, steam, or gas, so directed as to cooperate by induction to drive the fuel through the delivery pipe* in the manner shown in the drawings."

In Fig. 5 of the drawings the nozzle 6^a is shown acting as a velocity nozzle of blowing steam through the pipe 2 to give an added velocity to the fuel.

No. 730,884 to Davis (Ulen R. p. 339). This patent states (p. 342):

> "According to my invention improved means are provided for leading the fluid under pressure to the nozzle *k*, as shown, the nozzle being provided with a plurality of lateral apertures for the entrance of the fluid under pressure, it being understood, however, that but one lateral aperture may be used, if

desired, without departing from the spirit of my invention, since, as will be hereinafter seen, the principle of operation is the same in any case. Preferably the lateral apertures are arranged in the bottom *w* of the nozzle and extend transversely across the nozzle and are so arranged that entering fluid under pressure will be directed toward the mouth of the nozzle.

. . . . . .

"The fuel, as shown, descends from the hopper into the nozzle from above, while according to the arrangement of apertures *x the fluid under pressure is forced through the bottom of the nozzle* beneath the entering fluid and toward the mouth of the nozzle, *whereby the fluid is discharged therefrom with great force*, and the tendency is to spread the fuel rather in the form of a sheet to the combustion chamber."

No. 747,396 to Farnham (Ulen R. 347; and also in back of our main brief). This patent shows the chamber 1 for holding the material to be conveyed, the delivery pipe 6, and top and bottom pipes 7 for delivering compressed air into the tank 1, either above the material or into the delivery pipe 6, or into both at the same time. The velocity nozzle in this patent is marked 11. The patent states (p. 348):

"My invention relates to a sand-blast apparatus; and it has for its object to produce such an apparatus in which the sand will pass from the reservoir or tank by gravity alone or by gravity aided by compressed air within the reservoir under regulation, the sand passing from the tank through a delivery-pipe leading to a blast-pipe *provided with a blast nozzle or jet whose point of discharge is substantially beneath the discharge of the delivery-pipe into the blast-pipe*, so as to prevent any backflow of air from the sand-carrying pipe or hose into

> the delivery-pipe and at the same time *permitting the air-blast from the blast-nozzle to impact against the sand as it flows from the discharge-pipe, so as to drive it through the sand-carrying hose* to the point of its application."

The patent states further (pp. 348, 11, 89, *et seq.*) that the nozzle or jet 11 discharges compressed air into the delivery-pipe (exactly as is done in McMichael's commercial form), and states further at page 349:

> "At the same time the force of *the air blast from the nozzle* across the mouth of the discharge pipe strikes the sand as it issues from the mouth of the pipe and *propels it with velocity away from the pipe and through the carrying hose* and prevents any backflow or back-pressure from the hose or coupling and into the discharge pipe."

No. 758,118 to Sticker (Ulen R. p. 354). This patent states, at page 356, that by means of the velocity nozzle 30 a powerful impetus is given to the blast.

No. 837,113 to Phillips (Ulen R. p. 365). This patent shows almost exactly the arrangement of the patentee McMichael's commercial form. The patent states (p. 366):

> "The spout 13 when the conveyor is in operative position is arranged to discharge into a spout 22, which communicates with *a blast tube 23, having located therein a blast nozzle 24*, leading from a source of air supply (not shown). The end of the nozzle is located below and slightly in rear of the lower end of the spout 22, and *the blast therefrom is designed to direct the coal delivered from the said spout into a conducting pipe* 25."

Patent No. 837,622 to James (Ulen R. 368). This patent shows in Fig. 2 almost the exact structure of McMichael's commercial form. The patent states (p. 370):

> "A plurality of openings 26 are formed in the lower portion of the pipe 7, and are provided with closures 27, movable into and out of operative position, and these closures may be moved to permit the passage of matter from the conveyor into the chute, from which such matter will pass into the nozzle and *will be blown therefrom by the blasts from the pipe 21 and into the retort,* before which the nozzle is positioned."

The contention of the "velocity nozzle" was not raised in the lower courts, and the patents referred to are merely incidentally at hand, and many more could be produced on notice. The foregoing establish clearly that the "velocity nozzle" is an old and common expedient. In contending here that McMichael's invention is the "velocity nozzle," patentee in effect admits it has nothing other than what is old and common in the art.

Kolsche German Patent No. 18,394.

This patent shows a device practically identical with McMichael's, as so clearly pointed out by Judge BOURQUIN (R. 619, 620) as follows:

> "The third is Kolsche's German patent, 18,394 of 1882, for 'apparatus for conveying substances, slack, sandy, or granular material, by means of a current of air.' The apparatus is like McMichael's, without the U-bend; that is, it is an upright cylindrical container, with hopper bottom terminating in a discharge pipe. Compressed air is applied above or behind the material in the container, to force it down and into the discharge pipe, and at that point like air is admitted to assist in driving the material through the pipe.
>
> "Without any change, perhaps, save adjustments to circumstances as always, Kolsche's apparatus and method will transport concrete as does McMichael's. Kolsche could rightfully devote it to

> that analogous use. It follows that McMichael's essentially unchanged application of Kolsche to analogous materials and uses, is not invention. In principle, essential design, function, operation, object, and result, Kolsche and McMichael are one and the same. Either reads on the other. Kolsche, if later and devoted to concrete, might infringe McMichael, and by the same token, being earlier, he anticipates him."

A mere glance makes it clear that the only difference between Kolsche's and patentee's commercial device is in the diameter of the pipes. As to the relative size of pipes, the patent in suit states (p. 3, lines 120-122) (2d Cir. R. 286):

> "The engineer, in any instance, will readily understand what the relative proportions of the parts should be."

In the light of this teaching of the McMichael patent, his device and Kolsche's are patentably identical, as so clearly pointed out by Judge BOURQUIN.

In fact, "Petitioner's (*i. e.*, patentee's) *commercial* machine," as shown in the diagram facing page 76 of their brief, is like Kolsche and *is unlike the device of McMichael's patent*. The so-called "velocity nozzle" of patentee's commercial machine, like Kolsche's, points directly forwardly into the delivery pipe; while in McMichael's patent the so-called velocity nozzle is *within* the concrete containing chamber and merely discharges the air downwardly within the mass of concrete inside the chamber. Thus the patentee has abandoned the one novel feature of the patent in suit.

Respectfully submitted,

JOHN D. MORGAN,
ALAN M. JOHNSON,
Counsel for Petitioner.

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CHARLES ELMORE CROPLEY
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IN THE

Supreme Court of the United States

No. 3, Oct. Term, 1929.

Powers Kennedy Contracting Corporation, and Anthony G. Fleck, *Defendant-Petitioners,*

vs.

Concrete Mixing & Conveying Company, *Plaintiff-Respondent.*

No. 4, Oct. Term, 1929.

Concrete Mixing & Conveying Company (A Corporation), *Plaintiff-Petitioner,*

vs.

R. C. Storrie & Company (A Partnership), *Defendant-Respondents.*

RESPONSE OF APPELLEE IN OPPOSITION TO APPELLANT'S MOTION TO ADVANCE.

Charles E. Townsend,
Solicitor for Appellee,
R. C. Storrie & Company.

Press of Byron S. Adams, Washington, D. C.

IN THE

Supreme Court of the United States

No. 10, Oct. Term, 1929.

Powers Kennedy Contracting Corporation, and Anthony G. Fleck, *Defendant-Petitioners*,

vs.

Concrete Mixing & Conveying Company, *Plaintiff-Respondent*.

No. 11, Oct. Term, 1929.

Concrete Mixing & Conveying Company (A Corporation), *Plaintiff-Petitioner*,

vs.

R. C. Storrie & Company (A Partnership), *Defendant-Respondents*.

RESPONSE OF APPELLEE IN OPPOSITION TO APPELLANT'S MOTION TO ADVANCE.

To the Honorable, the Chief Justice and the Associate Justices of the Supreme Court of the United States:

Comes now R. C. Storrie & Company, Appellee, and moves that Appellant's Motion to Advance be denied for the reasons herein given.

The above entitled consolidated cases were argued one year ago (April, 1929), but the Court at its last session (March 17, 1930) ordered the cases restored to the calendar for re-argument.

Counsel for Defendant-Respondent (R. C. Storrie & Co.) having already acted on this order and accordingly arranged his cases in other courts, and likewise all his other business, cannot now be present and re-argue this case before Court adjourns on May 2nd without the greatest personal inconvenience and certain detriment to the business of other clients. The Honorable Court's attention is also called to the fact of counsel's residence, and required traveling from San Francisco, and the extremely limited time remaining—May 2, 1930.

Quite in contrast to Plaintiff-Petitioner's present desire to expedite this proceeding, the Honorable Court's attention is called to the fact that although the case against R. C. Storrie & Company was filed in February, 1924, Plaintiff-Petitioner has not heretofore made any attempt to press it to trial until after the Concrete Mixing & Conveying Company had sued the Great Western Power Company, an alleged infringer in San Francisco. And promptly following the filing of that suit in 1927 said Great Western Power Company proceeded to take depositions in various parts of the United States involving an expense of over twenty thousand dollars ($20,000) and produced evidence believed sufficient to invalidate the patent in suit. Plaintiff-Petitioner (in July, 1927) then moved to dismiss this San Francisco case without going to trial and sought to rush to trial the case of R. C. Storrie & Com-

pany, thereby forcing the said Company at still greater expense to retake all depositions previously taken in the San Francisco proceeding. It is submitted the substance of these depositions constitute the basis on which the trial Court and the Circuit Court of Appeals unanimously found invalidity of the patent in suit.

The foregoing clearly shows a voluntary delay of three (3) years on the part of Plaintiff-Petitioner, in striking contrast with its present Motion, and which, if granted, would save only the few months between now and October (1930) when this case can be properly reargued in its regular order as now set.

Petitioner in its Motion papers has greatly overstated the alleged infringements. For example, in the Southern California Edison Tunnels, the mileage total is approximately twenty-three (23) instead of thirty-five (35) and the amount of concrete used does not constitute over one-tenth (1/10th) of the twenty-three (23) miles.

Counsel herein is alone fully conversant with all the facts respecting the merits and position of Defendant-Respondent (R. C. Storrie & Co.) in this proceeding and cannot in justice now delegate to another its proper presentation to the Honorable Court.

WHEREFORE, it is respectfully prayed the time now set for re-argument by the Honorable Court be permitted to stand, and the Motion to Advance be denied.

Respectfully,

CHARLES E. TOWNSEND,
Solicitor for Appellee,
R. C. STORRIE & COMPANY.

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SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1928

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK
Petitioners

v.

CONCRETE MIXING & CONVEYING COMPANY
Respondent

No. 3

RESPONDENT'S BRIEF ON PETITION FOR CERTIORARI

STEPHEN J. COX
LYNN A. WILLIAMS
Counsel for Respondent

APPEAL PRINTING CO., 33 THAMES ST., NEW YORK CITY

Supreme Court of the United States

OCTOBER TERM, 1928.

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, *Petitioners,* v. CONCRETE MIXING & CONVEYING COMPANY, *Respondent.*	No. 501.

RESPONDENT'S BRIEF ON PETITION FOR CERTIORARI.

It is conceded that this is a proper case for the issuance of a writ of certiorari, but for the following reasons only.

1. The Circuit Court of Appeals for the Ninth Circuit has held the McMichael patent in suit No. 1,127,660 invalid in respondent's suit against R. C. Storrie & Co., in which Claims 2, 17, 34 and 35 of the patent, which were sustained in this suit, were also involved.

2. The decision of the Circuit Court of Appeals for the Ninth Circuit holds in effect that the subject-matter of the patent in suit is unpatentable and that the patent is therefore invalid, whereas the Circuit of Appeals for the Second Circuit in this suit holds in effect that the subject-matter is patentable and that the patent is therefore valid.

3. Only a decision by this Court can settle this conflict of decisions, which is a real conflict and leaves the validity of the patent in dispute.

4. The alleged infringing apparatus of the defendants in this suit and that of the defendants in the suit before the Circuit Court of Appeals for the Ninth Circuit are both covered by Claims 2, 17, 31 and 35, involved in both suits, if valid.

5. This respondent has filed in this Court a petition for writ of certiorari to the Circuit Court of Appeals for the Ninth Circuit to review the decision of that Court in the said suit against R. C. Storrie & Co., and prays therein that the said decision be reversed (see No. 528 Oct. Term, 1928, filed Nov. 5 , 1928).

It is contended by the respondent that the decision of the Circuit Court of Appeals for the Second Circuit in this case is correct, and should be affirmed, and that the decision of the Circuit Court of Appeals for the Ninth Circuit is erroneous, for the following reasons, among others:

1. The patent in suit has been twice considered by the Circuit Court of Appeals for the Second Circuit and in both cases has been held valid and infringed, affirming the decisions of the District Court to the same affect. The first decision was in the suit of this respondent against Ulen Contracting Corporation, *et al.* (12 Fed. [2d] 929,931) and the second in the present suit of the petitioner against Powers-Kennedy Contracting Corporation, *et al.* In both these decisions, as well as in the decisions of the District Court, the subject-matter of the patent in suit was considered in its entirety, as defined by the claims, this subject-matter including certain vital and indispensible elements, viz.: (a) a chamber adapted to be sealed, except at its discharge outlet, for receiving a mass of concrete, (b) a conveying conduit leading from said outlet to a distant point of delivery, (c) means for introducing compressed air back of or behind the mass

of materials in the chamber, and (d) means for injecting compressed air into the concrete at the outlet to detach successive portions of the mass under pressure and propel them into and through the conduit to the place of delivery, whereby the heavy homogeneous mass of intimately mixed rock, sand, cement and water is discharged from the chamber and forced into and through the conduit to the place of delivery substantially intact. This was never accomplished, with concrete or any other material, before, and no apparatus like that of the patent or for accomplishing this result in any manner is found in the prior art disclosed by the records of the three suits.

The Circuit Court of Appeals for the Ninth Circuit on the other hand did not consider the subject-matter of the patent in its entirety, but disregarded the nozzle or means for injecting compressed air at the outlet, positioned and arranged as specified, which is *the most vital and essential element*. This is shown by the language of their decision in which they say, referring to the principal prior patent (Smith No. 122,198 of 1872) in both pending suits:

> "The device contained all the features of the appellant's patent except the nozzle for admission of air near the point of exit." (All decisions printed in Appendix of Petition.)

2. The disclosure of the prior art in all three records is substantially the same. The decision of the Second Circuit Court of Appeals is based upon the subject-matter of the patent as described and claimed, and the decision of the Ninth Circuit Court of Appeals is based upon that subject-matter deprived of its most vital and essential element. The conflict between the two decisions, therefore, is not due to any difference in the records before the respective courts but to an erroneous definition of the subject-matter by the Court of Appeals for the Ninth Circuit, which was contrary to the disclosure and definition

of the patent itself and to the uncontroverted evidence as to its essentials.

The decision in the *Ulen* suit was rendered by Judge A. N. HAND in the District Court and affirmed by Judges ROGERS, HOUGH and MACK in the Second Circuit Court of Appeals. The decision in the Powers-Kennedy suit was also rendered in the District Court by Judge A. N. HAND and affirmed by a majority of the Court consisting of Judges SWAN and LEARNED HAND, Judge MANTON of that Court dissenting, but without opinion or memorandum. The decision in the District Court in the *Shonle* case was rendered by Judge BOURQUIN and was affirmed by Judges GILBERT, BUDKIN and DIETRICH in the Ninth Circuit Court of Appeals. The patent has therefore been sustained by one District Judge (twice) and five Judges sitting in the Appellate Court and held invalid by one District Judge and three Judges in the Appellate Court. Whether Judge MANTON's dissent was on the ground of invalidity or non-infringment, or both, does not appear. Assuming, however, that it was based on invalidity, we have six Judges holding the patent valid and five holding it invalid.

3. The decision of the Circuit Court of Appeals for the Ninth Circuit apparently not only treats as an anticipation the Smith patent which lacks the most vital element of the patent in suit, but appears to accept the Duckham British patents of 1875 and 1885 as anticipations, in spite of the fact that this vital element is not shown nor described in these foreign patents, the nozzle referred to in them being given no particular location and a function radically different from that of the nozzle of the patent in suit. It further appears to accept as a prior use an experiment by one Leake, although this experiment was (a) supported solely by the vague and indefinite testimony of Leake, without substantiation or corroboration of any kind in matter originating prior to the application

for the patent in suit, which (b) admits that the vital element of the nozzle at the outlet was lacking, and (c) is the testimony of a man who permitted McMichael to receive the award of priority over him in the Patent Office. The Court also erroneously accepted *ex parte* statements made by Leake and his attorney in the Patent Office as evidence, the latter unverified and evidently based on hearsay, and relating to matters subsequent to the application for the patent in suit.

1. The Court of Appeals for the Ninth Circuit did not correctly apply to the state of facts before it the decision of this Court in *Concrete Appliances Co.* v. *Gomery*, 269 U. S. 177, which recognizes that where structural changes are necessary in the adaptation of an old apparatus to the handling of new and different material for which it was not previously adapted, as in the present case, invention of the highest order may be involved. The Court assumed that the fact that the Duckham apparatus "was engaged in moving a material quite different from concrete" "is not of importance on a question of anticipation," whereas it is of the highest importance on a question of anticipation if, as in the present case, the handling of the new material necessarily involves an unobvious change in structure or method of operation not found in prior devices or methods. In the *Gomery* case no material change was required to adapt the old devices to the gravity distribution of concrete, and further as the Court of Appeals for the Third Circuit said (291 Fed. 486, 489): "substantially similar concrete chuting apparatus" was shown to have been used prior to the application for the patent there in suit.

On the other hand the Court of Appeals for the Second Circuit correctly interpreted the decision of this Court in *Concrete* v. *Gomery*, as based on the finding that the patent there in suit

> "* * * merely made use of known methods and appliances for the convenient handling of this recently accepted building material" * * *

and further on the well recognized principle of law

> "* * * that old apparatus used for distributing water, grain or coal was readily adaptable for handling concrete," * * *

and therefore no invention was involved in making this ready adaptation. The fact that the Second Circuit Court of Appeals further noted that such adaptations had been made prior to the application for the patent in the *Gomery* suit does not, as contended by the petitioner, mean that it distinguished the *Gomery* case on that ground. It means nothing more than that the Court, while recognizing the full weight of the decision on the question of law involved, noted the fact stated as indicating a reason for the application of the law which does not exist in the present case.

The decision of the Second Circuit Court of Appeals was therefore correct in holding that because the adaptation had never been made, was far from obvious and involved a new method of operation, invention was involved; and that

> "to do this was to make a new machine, and one who thought of doing it would have had a new and inventive idea;" * * *.

The fact alone that no device of the prior art, for handling any material, disclosed the idea or plan of maintaining the material in a closed vessel with compressed air behind it forcing it into the outlet *as a mass* and injecting into it *at the outlet a velocity jet of compressed air* to detach successive portions of the mass and drive them to and through the conveying conduit, was suffi-

cient to support this finding, without the added evidence that this plan *though long needed was never employed and when adopted went into universal use, supplanting other means, and performing work of inestimable value.*

5. The Court of Appeals for the Second Circuit was correct in finding that McMichael had the right to better explain his invention and claim it more fully during the pendency of his application in the Patent Office, without departing from his original disclosure, and that if he did add any matter to his application which was new in any sense it was covered by his new oath accompanying it (Ulen R., p. 251, Exhibit D, R., 45), thereby affirming the decision of his Honor, Judge LEARNED HAND (*Id.*, p. 13, R. 42), to that effect.

6. The Court of Appeals for the Second Circuit was not in error in holding that the machine of the patent in suit operates as described in the specification and is not open to attack on the ground that it does not.

7. The Court of Appeals for the Second Circuit was not in error in giving no weight to the article published in the Journal of the Western Society of Engineers in 1918 by Mr. Kirkland, or in giving it no weight as against the description of the operation of the invention as described and claimed in the patent in suit (see Exhibit H, R., 144, 147), because the statements in that article were unverified statements, were made by a person who had no interest in the patent in suit and no interest with any one but a mere licensee under the patent, were not made in this suit or any other suit and were corrected by Mr. Kirkland when called by the defendants as their witness.

The record in the *Ulen* suit should be included in the record in this suit to be certified, and incorporated in the printed record here as a paper exhibit.

This is the record in the suit of the respondent against Ulen Contracting Corporation, *et al.*, before the Court of Appeals for the Second Circuit in 1926 (see 12 Fed. [2nd] 929, 931), and was offered in evidence by the defendants at page 45 of the present record, after certain portions of it were offered (R., 42 and 43) as Plaintiffs' Exhibits 6, 7, 8 and 9. It is marked Defendants' Exhibit D (Index, R., VI), and was used in the District Court and in the Court of Appeals as evidence. Under the stipulation as to the appeal record (R. 436) this Exhibit D, Ulen record, was produced before the Second Circuit Court of Appeals in triplicate. It contains important evidence relating to the prior art, the operation and advantages of the patented invention and other matters, which is not in the transcript of record on this petition for writ of certiorari, but was considered by the District Court and the Second Circuit Court of Appeals in this suit. Without it the record before the Court of Appeals for the Second Circuit is incomplete.

CONCLUSION.

For the foregoing reasons, if the writ of certiorari is granted to review the decision of the Circuit Court of Appeals for the Second Circuit, the said decision of the Court should be affirmed, and the decision of the Circuit Court of Appeals for the Ninth Circuit reversed.

Respectfully submitted,

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Counsel for Respondent.

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SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1928

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK
Defendants-Petitioners

v.

CONCRETE MIXING & CONVEYING COMPANY
Plaintiff-Respondent

No. 501

3

BRIEF FOR PLAINTIFF-RESPONDENT

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Supreme Court of the United States

OCTOBER TERM, 1928.

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, *Petitioners,* *against* CONCRETE MIXING AND CONVEYING COMPANY, *Respondent.*	No. 501.

BRIEF FOR RESPONDENT.

CORRECTED STATEMENT OF THE CASE.

There are so many errors, inaccuracies and omissions in the "Statement of the Case" in petitioners' brief that the following corrected statement is deemed necessary. The numerals correspond generally with those of petitioners' statement.

1. The original decision of the Court of Appeals for the Second Circuit sustaining the McMichael patent in suit No. 1,127,660 is found in the case of *Concrete Mixing & Conveying Company* v. *Ulen Contracting Corporation, et al.*, reported in 12 Fed. (2), 929, 931. The record in that case is Exhibit D in the present suit, and the opinion of the lower court (A. N. HAND, J.), is also found at pages 395 to 402 of that Exhibit record. The Court of Appeals (ROGERS, HOUGH and MACK, JJ.) affirmed in that case without opinion. Reference to this decision is omitted from petitioners' list of "Opinions of Lower Courts."

2. The McMichael patent is not for **blowing** concrete, but for transporting and placing it by pneumatic **pressure.** It is for an air *pressure* method and apparatus for conveying and placing concrete *in a mass*, as distinguished from blowing or flotation, such as was previously employed in the conveyance of light or finely divisible materials, such as grain, dust and sand. *Neither the word blowing nor any equivalent expression is found in the patent.* Nor is such a term used in the practical art.

The words "blowing" and "blow" so frequently used in petitioners' brief are therefore misleading, and were evidently invented by the petitioners to confuse the pneumatic pressure apparatus of the patent with prior irrelevant patents for devices for the blowing or flotation of such materials as could be blown or floated in air, and which devices could not be employed and were worthless for the purpose of transporting concrete.

The air jet at the outlet of the chamber 1 of the patent in suit *is not within the chamber,* but "at or near to the discharge or lower end of the hopper 2" (Pat. R. 284, line 62), so as to discharge a jet of air *in the outlet,* as the patent very fully describes and claims, and as the drawing shows. The requisites of this outlet air jet as to character, location and action are fully specified in the patent *and leave no possible room for misunderstanding.* It must be so located and arranged as to discharge a jet of air into the materials as they pass through the contracted outlet of the vessel. Its location is not limited, but is expressly *unlimited,* to the exact location illustrated, so long as it is so located as to discharge its jet of air into the materials *as they pass through the contracted outlet.* It is shown in the patent as located in the vessel only in the sense that it is in the *outlet* thereof and so directed as to discharge its jet into this outlet in the direction of the delivery pipe, and into that pipe.

All apparatus made under the patent, and the petitioners' apparatus as well, *are a full embodiment of this feature*, the location being varied slightly only to adapt the bottom jet to the performance of its peculiar functions in different sizes and forms of apparatus (see drawings, *infra*, and R. 292-294, also Exhibit D, pp. 188 and 194-5).

3. **The McMichael patent is for a pioneer invention.** No apparatus or method for pneumatically conveying concrete or any similar material, was known prior thereto, although concrete had been conveyed in various other ways from time immemorial. The Court of Appeals so held in this case.

4. The only apparatus which even purported to convey concrete pneumatically was that of the Smith *paper* patent of 1872, which pretended to convey "liquid" concrete by merely putting air pressure behind it, *and lacked the most vital and essential feature of the McMichael apparatus, viz.: the compressed air jet at the outlet.* The absence of this feature rendered it *useless.* No attempt has been made to show that it was ever used or could be practically used for concrete. But even if it could it would have no bearing on the McMichael patent because it lacked *the essential feature* specified in the latter and included in all the claims.

5. **Nor was this jet or the method made possible by it disclosed in any other patent.** The *Beach* patent No. 267,318 (R. 305) shows merely a pipe, G, into which light, loose material—"grain, etc."—is fed through a small pipe F and there taken up by a current of air and *floated* along "*in suspension*" (R. 307, lines 2-21, 36-45). There is no jet or nozzle at all. (All italics in quotations ours unless otherwise noted.)

The *Farnham* patent No. 747,396, shows a "*sand blast* apparatus" in which the sand passes from a tank, 1,

through a relatively long narrow pipe, 2, to an "air-blast pipe 7," with a nozzle, 11, "projected across the mouth of the discharge-pipe 2" so that it "creates a *suction* across the discharge-pipe and down through the same, so that the downflow of the sand through the pipe is greatly facilitated" (Pat. p. 1, line 79, etc.). This is not the McMichael jet projecting compressed air *into the outlet to force* the material under *high pressure* through the contracted outlet and into the delivery pipe, but is a *suction* nozzle creating a feeble suction to draw loose, finely divided materials through the outlet and then float it on the blast of air. It could not be used with heavy, rocky, plastic concrete or any similar material, and gives no suggestion of the form, location and purpose of McMichael's pressure concrete-shooting jet.

The *Warren* patent No. 671,303 is also for a *"sand blast"* device, and like the Beach patent has the sand passed through a small discharge pipe, D, and discharged into an enlarged cylindrical air *"chamber,"* E, into a blast of air passing through said chamber, "with which it mingles and by which it carried" (Pat. lines 68-9). This does not even show a jet or nozzle of any kind.

The *Goldie* patent No. 707,840 permits the material (dry cement and sand) to flow by gravity from a "funnel 16" through a small pipe, without pressure behind it, and in a loose state, and then in the course of the pipe subjects it to "a suitable source of fluid-pressure such as the steam pipe 17" (Pat. p. 2, line 108, etc.), so that it mingles therewith and with water from a pipe 20 and passes along to a point beneath railroad ties. The patent is for "ballasting railway tracks" and the crude device does not pretend to work like McMichael's, if indeed it would work for any useful purpose even with the fine, dry materials mentioned.

In all four patents the pressure jet impinging on the packed heavy mass of materials as they pass through

the outlet of the vessel, under heavy pressure, to shoot them—*after the manner of a blow gun*—is lacking. The McMichael method or apparatus *is not even suggested*, and the apparatus of each patent is so constructed as to float the materials along in a state of suspension mixed with air and the operation *is absolutely impossible with such material as concrete.*

These prior patents are all for *flotation or "kinetic"* apparatus, whereas the McMichael patent is for a *pressure* apparatus and method in which the materials are propelled en masse and without separation or disintegration. *The difference is radical.*

6. **The McMichael patent is not for handling "granular plastic and fluent materials," but for "transporting and treating concrete," and concrete only.** This is called "concrete," or "concrete forming materials" which means the same thing, in the specifications and claims. The material is fully specified in the patent as "a composition containing relatively large pieces of rock or stone, as uniform in size as possible, together with predetermined proportions of sand, cement and water," the purpose of which is to produce when placed and set "a hard rock-like body"(Pat. p. 2, lines 100, etc.). In other words it is *concrete in a plastic or unset state.* The fact that McMichael when he filed his application expected to use his apparatus for conveying other building material such as sand and plaster *in addition to concrete* has nothing to do with the patent as issued, which is expressly and specifically limited to *concrete.* Probably the apparatus and method described will convey other things in a more or less wet, plastic state, so that they can be *packed* and shot by pressure like a projectile in a blow gun, but nowhere in the patent or the proceedings leading up to it is any claim made that they will act on these materials except by *pressure*—and not by flotation or kinetic action—

as they can only and must act on concrete. In the patent, and at every stage of the proceedings, from the beginning (see amdt. Jan. 18, 1908, Ulen R. Exhibit D, 206) the distinction between the apparatus of McMichael and "current of air carrying" and liquid forcing apparatus is emphasized, and this distinction is made clear and unmistakable in the patent (p. 2, lines 73, etc., p. 4, lines 29, etc.). Thus it is made clear and emphasized that the vital feature of the invention is *a combined static and velocity high pressure which first presses the mass of plastic materials into a restricted neck and there subjects it to a velocity jet which penetrates the mass and drives it into and through the conveying conduit to the point of delivery* (p. 2, lines 25-73 and 80-92).

The persistent and oft repeated use of the words "blow" and "blowing" and the equally persistent reference to "granular plastic and fluent" materials in petitioners' brief is an obvious attempt to create a misunderstanding of the invention.

The narrow contracted neck of the vessel and its outlet are *part of the receptacle* or retort in which the materials are operated on by the combined static and velocity pressure. It is the same in the patent and respondent's apparatus as in petitioners' apparatus. *The vital thing is that the materials are pressed into the contracted outlet and in this outlet penetrated and driven forward by the velocity jet.*

7. **The prior patents do not show that blowing or pneumatic conveyance of any materials, except very light or very finely divisible materials, was practiced.** Much less was pneumatic conveyance of plastic concrete, a mass of broken rock filled with wet sand and mortar, practiced. The only patentee who *dreamed* of such a thing was Smith in 1872, who never *practiced* it and never

could have practiced it, with his apparatus, because he got no farther than to put air pressure behind his material only, *and without any nozzle action,* thinking that he could force it through a pipe in this manner a short distance from a mixer to a roadway. Even he realized that he could have no hope of doing this unless he used *liquid* "concrete." He therefore proposed to use *"three-fifths"* of water, making a "fluid" *"capable of flowing freely through pipes,"* like water (Smith Pat. 122,497, p. 1, par. 3). In other words he proposed *to float his concrete aggregates in water* (water has 800 times the density of air), and incidentally to *destroy* their value as building material, which alone explains why in the forty-five years between the Smith patent and the McMichael patent Smith's method and apparatus *were never heard of.*

The fact that petitioners have *called* their concrete "liquid" means nothing. It is *not* liquid. The engineers of the Transit Commission would no more have permitted them to use liquid concrete than ordinary clay in the subway lined by them with thousands of human lives to be protected by it daily. Concrete must be, when set, as hard as the rock which is lined by it, or harder. What the petitioners did use was "plastic" concrete which needed to be rammed, as their specifications required (Exhibit 19) and in which the inspectors, according to Mr. Kennedy, their superintending officer, permitted them to use "a little more water" (XQ149, R. 220).

The blowing of light or finely divided materials described in the prior patents is something radically different from the pressure shooting of concrete of McMichael's method and the petitioners'. In the former the light or fine materials are actually *floated* in a large volume of air, like leaves, dust or sand in a gale—while in the latter plastic concrete, which is as heavy as rock—two tons per cubic yard—and is in fact "rock in the making," is *forced,* without separation, by high air *pressure* through a pipe,

which it fills substantially, at a rate of a mile a minute, any desired distance and to any desired elevation, around numerous sharp bends in the pipe if necessary, to the point of placement where it is driven home or packed by its tremendous momentum. That it is delivered *solid* is conceded; and this alone proves that it is not floated en route in air.

8. Thus we see that the petitioners are not using anything taught by prior patents, but are using the method and apparatus of the McMichael patent in suit in its entirety.

9. **The form of apparatus used by the respondent in its commercial apparatus is that of the McMichael patent as shown, described and claimed.** The *exact* location of the all-essential jet at the outlet is immaterial. The patent teaches that this jet or "velocity nozzle" is to be located near where the contracted outlet joins the discharge duct or delivery conduit and arranged to direct the compressed air jet *"into the discharge duct,"* as the claims have it (see Claims 17, 21, 28, etc.) the discharge duct being "left substantially unobstructed." The patent makes it clear that the outlet of the vessel, where it merges with the discharge duct must be gradually contracted but open to the static pressure behind the packed mass in the vessel and free of obstruction and that the velocity nozzle *must be located there and directed into the duct.* The exact form and proportions are not important so long as this formula is followed; and this formula is followed in all respondent's commercial apparatus, as it must be. The petitioners' apparatus—as usual—is *an imitation of respondent's commercial apparatus* (see Ulen R., Exhibit p. 183, &c. and Exhibits 3, 4, 5, R. 292-4) *and embodies the requirements of the patent, and its claims, in every particular.*

10. **The patent is not for the slug theory, or any other theory, but for a method and apparatus for transporting concrete, in which a combination of pressure behind a mass of concrete and a jet of pressure injected into it at a contracted discharge outlet is employed in a certain way.** It is believed that this results in the rapid detachment of slugs or "sub-masses," which are driven or "shot" through the discharge conduit by the pressure to the point of delivery, and that in this manner only can the transportation and delivery of the heavy, rocky concrete by air pressure, in a mass, without disturbing the intimate mixture of the aggregates, be accounted for. *Whether this is correct or not, however, is a matter of no importance.* It is certain that the astonishing result of conveying and delivering tons of carefully mixed concrete *intact* by a small jet of compressed air, at a pressure easily produced and maintained, is accomplished by the patented invention, and that the respondent has used that invention in all its essentials, and this is sufficient.

Nothing was added to the original disclosure of the McMichael application which was not based on his original drawing and description. Not a line of his original drawing was changed. This drawing in the patent is *identical* with the original drawing as filed, and the original description and claims set forth the apparatus and its operation with sufficient fullness to enable a "person skilled in the art" to understand, make and use them. Any such person following the original application could have made and used an apparatus embodying the invention. McMichael, however, may not have understood fully, the wonderful range of usefulness of his invention nor the full nature of his discovery. And in elaborating his description and claiming his invention in such a way as to cover and protect it properly he did only what he had full right to do. This required no new oath,

since it was within his original disclosure and departed from it in no way. *McMichael, however, did file a new oath,* covering everything in his patent as granted (File Wrapper, Ulen R., Exhibit D, 251), and this disposes of the question.

11. **That petitioners' apparatus uses all the features of the patent, including compressed air above the concrete in the chamber, or "behind the mass" is not seriously disputed in the evidence.** The only matters on which any question is raised are the position of the jet at the outlet and the pressure behind the mass. As to the first, it is not contended that the function or result is not the same nor that the characteristics of the jet at the outlet as described and claimed in the patent are not present. The matter is purely an argument of counsel with no basis in evidence or fact. The slight variations—now stressed for the first time—are of form and not of substance. As to the second, even petitioners' expert admits that pressure in the upper part of the chamber and behind the mass is established as soon as air is turned on at the outlet, and is maintained at all times during operation, as shown by the pressure gauges. This was noted by both the District and Appellate Courts in their opinions, and is indisputable.

The infringement is full and complete. *No prior patent shows or suggests this combination of pressure behind the mass and jet action at the front of the mass* which is so vital to the present invention, and which petitioners find it necessary to use in order to produce an operative apparatus and method.

The patent is not limited to more than one compressed air pipe, and one or any number of them may be used. Two were originally used by petitioners, and their testimony that the use of two was discontinued some time after the infringement was commenced, is not clear

(Kennedy, Q34, R. 205, and Swartz, R. 230-231). The top air pipe was not disconnected for at least three years and until the spring of 1926 (R. 206 and 230) when the case was first called for trial. But this is all immaterial, since the patent describes and explains the method and apparatus in several of its claims, without requiring an air inlet at the top, and it is admitted that without the top air inlet it worked *in the same manner.* It had air pressure in the top, as well as at the outlet nozzle, the compressed air shooting up to the top from the lower nozzle, and establishing a body of compressed air there, behind the mass, *as soon as it was turned on.* (Opinion, A. N. HAND, J., R. 327, do. Appellate Court, R. 347-8, Kennedy Q81, R. 212, Dyer, R. 245, Swartz Q61, R. 235).

Respondent's apparatus made by its licensee, the Ransome Co., had a lower air inlet only (*Id.* 188).

12-13. Petitioners' apparatus is so far from the Goldie and other prior patents, that the assertion that it is "operated in exact accordance with" it, or them, merely indicates the extremes to which petitioners are willing to go in the absence of real defensive material. To summarize the Goldie patent, it has

(a) No pressure behind the mass (such a thing is not even suggested), and can have none because the vessel is not air tight,

(b) No means for getting the material out of the vessel, except its own feeble gravity,

(c) No jet or nozzle at or near the outlet, but merely a blast of steam or air remote therefrom, and down the narrow delivery pipe at a point to which the material must travel by gravity alone, and

(d) The vessel is isolated from the blast of steam or air by a length of narrow pipe.

It could not and was not intended to handle concrete, or any similar substance, and evidently could not be used practically for any useful purpose.

14. The statement that respondent's apparatus "operates precisely as does *all* the devices of the prior art" is self-contradictory. It would be impossible for one apparatus to operate as did any two of the different and variously operated prior devices—most of which could not operate at all.

The statement that respondent's engineer "blew" screenings through his machine has no relevancy, if true. If it will convey concrete the fact, if true, that it will convey something else tends to prove nothing against it.

15. The alleged prior use was an attempt to prove a use 22 years old by the oral testimony of two witnesses who had no contemporaneous records, apparatus, or other visible, tangible evidence whatsoever to support them or refresh their recollection, and they were fully contradicted and discredited. Their testimony was rejected by both trial and appellate courts.

The infringing apparatus in the Ulen suit was less like the illustrative embodiment of the patent than petitioners'. This will at once be apparent from an examination of the drawing of it (Ulen R., Exhibit D, 184). The Ulen device had a *horizontally* arranged vessel and employed a *piston or plunger* to move the concrete from the charging end of the vessel to the discharge outlet, whereas in the patent and in petitioners' apparatus the vessel is *vertically* disposed and does not employ a piston or plunger. In the Ulen apparatus the nozzle at the outlet was directed across the discharge duct, and not into it, as in the patent and petitioners' device.

There were also other differences. The Court held, however, that these differences were of form and not of substance, and that the Ulen apparatus was con-

structed and operated in substantially the same manner as that of the patent in suit.

The concrete used in the Ulen apparatus was the usual mixture employed for tunnel lining. It was "pretty soft" (Ulen, R. 118). All concrete is as wet as the contractor can make it under his specifications. The petitioners' concrete was of substantially the same character. The engineer's specifications called for concrete which had to be tamped or rammed. (Specification, Exhibit 19, R. 296, Kennedy Q15, R. 202) and petitioners induced the inspectors to permit "*a little* more water" (Q147, R. 220).

Petitioners' witnesses call it "liquid" concrete, but, of course, it was no such thing. There is no such thing as liquid concrete. Concrete is a mass of rocks with their interstices filled with sand and cement, and *cannot be* liquid. The so-called "liquid" concrete of the Smith 1872 patent is really nothing but concrete aggregates, so diluted in water that they will flow under pressure. But such a mixture is not concrete at all and will not form useable concrete.

The only fluent material in this general class is grout, which is a fluid composed of sand, cement and water, with no rocks. This can be made to flow through pipes by simple pressure behind it and in a solid column; and this is probably what Smith in 1872 had in mind, if, indeed, he knew anything about the subject. Concrete, being essentially a mass of small rocks or stones, will not flow any more than the rocks themselves will flow.

With the exception of this Smith paper patent of 1872, the same patents were in the Ulen suit as in the present suit. The Beach patent was pleaded in the answer (Ulen R. 8), but was evidently not considered of sufficient importance to be offered in evidence. This is also true of the Kolsche German patent 18,394.

The issues, therefore, in the Ulen suit were substantially the same as in the present suit, except that the present

infringing apparatus is closer to the embodiment illustrated in the patent, and is substantially a copy of the apparatus made by respondent under the patent (Ulen R. 183-4, 188).

ARGUMENT.

Brief Summary.

I. The patent in suit is for a pioneer invention, which solved a hard problem of long standing, conferred a great benefit on humanity, created a new practice in concrete construction and is acknowledged as such, actually and by its general adoption.

II. The invention operates in a peculiar and unprecedented manner, functions in a fashion considered impossible in the art, and produces a surprising and highly useful result which cannot be attained by any other means.

III. It has eliminated laborious, expensive and ineffective operations and accomplished work which could not have been consummated without it. Accordingly it has effected an enormous saving in all the work on which it has been employed and has made possible great enterprises which otherwise might have been unsuccessful.

IV. The original specification of the application fully disclosed the invention of the patent. The claims and the amplified disclosure of the patent are also supported by a supplemental oath.

V. There is nothing in the prior art that could have taught any one how to make and use the invention. The marked departure of the invention over the art is emphasized by comparison.

VI. The petitioners have used the apparatus of the patent, and have practiced the method described and

claimed therein. Their copying of respondent's commercial apparatus has been full and complete. Petitioners' subtle praise of the invention is emphatic.

VII. The decisions in the Second Circuit are correct on the facts and the law and should be affirmed. The decision in the Ninth Circuit is based on an erroneous conception and interpretation of the patent and the prior art relating thereto. It also accepts as evidence of prior art, matters which are not evidence at all. It should therefore be reversed.

I.

THE McMICHAEL PATENT IN SUIT.

The patent in suit is for a pioneer invention, which solved a hard problem of long standing, conferred a great benefit on humanity, created a new practice in concrete construction and is acknowledged as such, actually and by its general adoption.

In order to understand the patent we must first understand the nature of the material, structural concrete, in connection with which the patented invention is used, and the conditions which must be observed in handling that peculiar material.

Concrete consists of a mass of small rocks or stones in the form of crushed rock or coarse gravel, usually of a size which will pass through the holes of a screen having openings 1½ to 2½ inches in diameter. The defendants' rock in this case was passed through a 1½ inch screen (Kennedy, R. 214) or a 2 inch screen (Engineer's Specifications, Exhibit 19), which means that one diameter was 1½ or 2 inches and the other greater or less. The mixture was about 4/7ths rock, 1/7th cement and 2/7ths sand (Kennedy 237, R. 206)—a 1-2-4 mixture as it is called—and was therefore a mass of rock or gravel stones *with*

the spaces or interstices between the stones filled with wet sand and cement. The exact nature of the material is carefully specified in the patent (R. 285, lines 100-108).

These concrete mixtures weigh about 150 pounds per cubic foot, or a little more than *two tons* per cubic yard, and a yard or a half yard is usually discharged and conveyed in one batch. *It is as heavy as solid rock,* and *is* rock, in effect, in a plastic state.

Under most working conditions the concrete must be conveyed, long distances, around bends in the conduit and up to considerable elevations. In the petitioners' work it was conveyed *as much as 1,160 feet, around 14 bends of 90 degrees and up to elevations of 60 to 67 feet* (Kennedy R. 203). These conditions may be considered normal; and much harder conditions are sometimes encountered.

To this mixture of rock, sand and cement is added a small quantity of water, which should be sufficient only to *wet* the aggregates and hydrate the cement, causing it to act. Usually a little more water than is necessary to do this is used. In other words, there is a slight excess of water. The reason for this is that a little extra water makes the plastic concrete mixture more plastic and workable, and causes it to settle in the forms better and without much tamping or ramming. This is called "wet" concrete; the ideal mixture with no excess of water is called "dry" concrete.

But only a slight excess of water is ever properly permitted by engineers or inspectors who understand the subject, because it is well known that even a small excess of water will dilute the cement, rob it of its binding strength and leave innumerable flaws or "voids" to weaken the structure. Even a mixture so wet as to destroy the natural strength of the concrete almost completely *would not be liquid,* however, and would not flow like a liquid or semi-solid because *the mass of rock will*

not flow, but will merely *settle* or *pile up* in a heap. This would happen even if the finer parts of the mixture were so diluted as *to run out of the stones.*

The concrete aggregates must also be thoroughly and intimately mixed—usually in a highly efficient mixing machine—so that each stone and each grain of sand is coated with cement and the rocks are evenly distributed throughout the mass with the sand and cement intermingled with them *in uniform proportion at every point* (see Kirkland, Ulen R. 51).

The specifications under which the petitioners worked were very rigid as to this mixing, and made careful provision to insure a thorough and intimate mixture (Exhibit 19, R. 296). They also were particular as to the volume of water and the "plastic" character of the mix, which was such as to require "ramming," so that the mass would be "thoroughly compacted throughout." This was the usual "stiff" or "dry" concrete which is used for work requiring such strength and solidity as tunnel linings must have. Certainly it was not wet; and to say that it was liquid, in any sense, even with "a little more water" added, is absurd. And finally the concrete mixture must be transported and placed in the form *quickly*. It begins to set as soon as the cement is hydrated, even before it starts to dry, because the setting is a chemical action set up by the water. Thus the specifications for petitioners' work required that the "concrete shall be placed immediately after mixing "(Exhibit 19, R. 296, par. 163).

Concrete is therefore substantially plastic rock, composed of a mass of rock pieces carefully and intimately mixed with sand and cement and a small amount of water, is approximately as heavy as rock, is not fluent in any sense but must be moved bodily, and in such operations as lining tunnels must be transported quickly to and placed at great distances from the mixer and at high elevations through relatively small and winding pipes.

The McMichael invention handled this heavy difficult material perfectly under all working conditions by the seemingly impossible means of a small amount of compressed air.

It did this in the following manner:

1. By providing a closed, air-tight vessel or chamber (1 in patent), with a conical bottom 2, in which the concrete materials are deposited, through a sealing door (3), in a mass.

2. Providing for a body of compressed air in the chamber, behind this mass of materials, to press them into the contracted outlet and discharge duct of the chamber.

3. Providing a velocity jet of compressed air at the outlet to inject compressed air into the materials at that point, to force them into and through the discharge duct to the distant place of delivery.

In brief, the invention consists essentially in a method and means for conveying mixed concrete materials by establishing air pressure behind a mass of the materials in a closed chamber to compact them and force them into the outlet duct thereof, and simultaneously injecting a jet of compressed air into the outlet and the materials therein to drive them to the place of delivery.

The pressure behind the mass is substantially *static* and acts to compact the concrete and force it into the outlet, while the jet at the front of the mass is *dynamic. The combination of the two forces acting together on the mass is what does the work.*

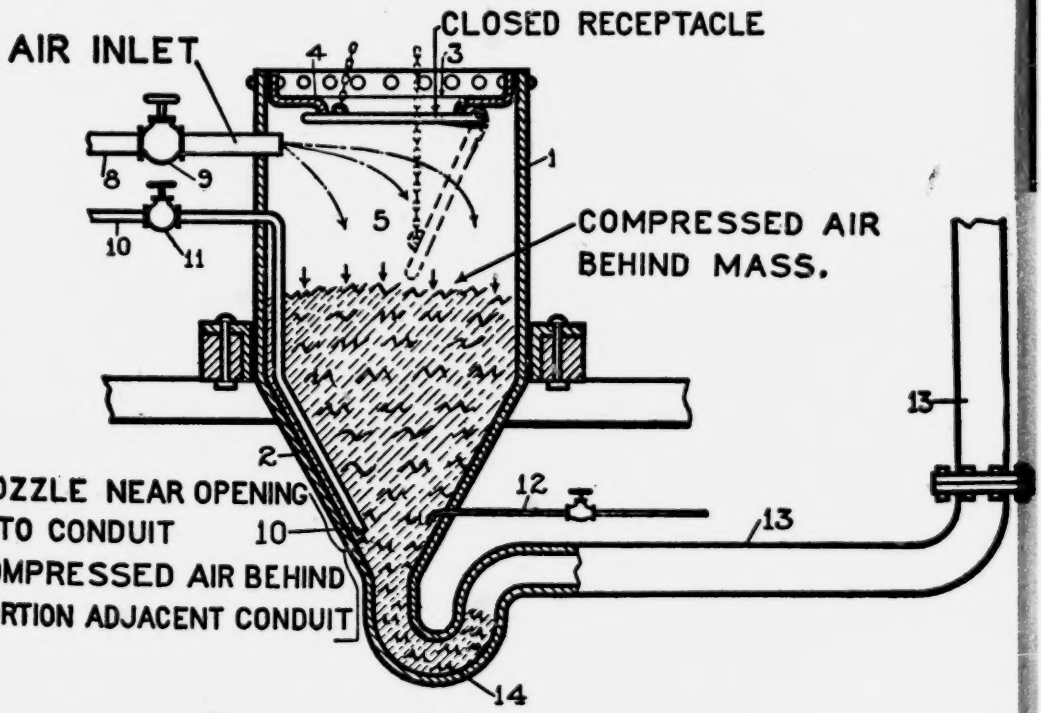
It will be noted that the materials are acted upon *as a mass* and not as separate particles, and that the mass is *never liberated* from this pressure, but is held under it and driven by it, without being broken up or

disintegrated, to any desired distance or elevation, substantially *intact*, and at high speed under air *pressure*.

The bottom jet is of course the most vital thing in the combination of instrumentalities or forces. But without the pressure behind the mass it could not work, and this pressure must be present at all times, either by the admission of air directly behind the mass or by such air shooting up through the mass from the bottom jet at the beginning of the operation and establishing a body of compression behind the mass. There must be a substantial balance of front and back pressure, one acting to a certain degree against the other to produce the necessary result.

The following cut, taken from the drawing of the patent, illustrates the essentials of the patented method and apparatus.

PATENT IN SUIT



In the cut the lower jet is the nozzle end of the compressed air pipe 10 which discharges into the neck or restricted outlet of the chamber or receptacle 1 and into the curved portion 14 of the conveying conduit 13. The top air pressure or "pressure behind the mass" is supplied by the pipe 8. The small pipe 12 "may" be used to inject a small amount of water, but is not used in modern practice, and need not be used at all unless the aggregates are placed in the chamber actually dry. The pressure behind the mass may be supplied in most cases by the air from the bottom jet or nozzle, as it will shoot up through the materials and *establish* a body of compressed air in the top, when the air is first turned on. The bend 14 is also usually unnecessary, but may be used if desired (Petitioners use such a bend; see Exhibit 3, R. 292). The top air inlet, bend in delivery pipe and little water pipe are *non-essentials*, and are included in certain specific claims only.

As shown in the patent, the compressed air is supplied to the discharging chamber from a pressure tank 6 supplied with compressed air by a compressor 7. The pressure is the same in both air pipes, 8 and 10, but is controlled by valves 9 and 11 on the pipes, so that the pressure and volume of air may be regulated.

The nature of the invention and the joint action of the two pressures are fully set forth in the specification of the patent. It says in part (p. 2, lines 46-58, R. 285):

> "It will be observed that the upper air pipe 8 serves merely to supply air to the upper part of the chamber 1, the pressure of the air being uniformly applied over the entire upper surface of the mass. The lower pipe 10, however, serves to direct a jet of air moving at a considerable velocity directly against portions of the mass as they move toward and into the discharge duct. The two pipes

> thus act in very different ways, the upper pipe supplying air which acts by pressure and the lower pipe supplying air which acts by velocity."

And again (*Id.*, lines 68-80):

> "Air from the lower pipe 10 may force itself into the body of the mass, and the relatively small air jet acting upon the relatively large stream of outward moving materials directly engages with the *sub-masses* to *push* them along. This action of the two air bodies in my apparatus is to be contrasted with the action of air in earlier devices which were so constructed that light materials such as grain or ashes could be caught in large moving air bodies and carried along *in suspension with each particle separated from the others.*"

The apparatus, therefore, and the method which it enables the user to carry out, acts by *pressure*, and *not by kinetic action or flotation*, which is a very different method, and was useless for handling concrete or any substance having relatively large heavy elements.

That the invention is peculiarly adapted to the handling of concrete is well specified. The nature of the mixture called concrete is carefully defined in the following language (*Id.*, lines 100-105):

> "As is well known, the material referred to as concrete is a composition containing relatively large pieces of rock or stone, as uniform in size as possible, together with predetermined proportions of sand, cement and water."

It makes no difference, however, whether the concrete is "wet" or "dry." The specification says (*Id.*, p. 3, lines 35-59):

> "It is more or less common practice to add an excess quantity of water in order to insure at least approximately complete coating of the rock pieces

> in as short a time as possible. This excess quantity of water not needed for crystallization must of course evaporate before the concrete can reach its final dry condition. One of the important advantages incident to the use of a device embodying my invention is that this undesirable excess of water can be reduced to a minimum or entirely eliminated, satisfactory coating of the rock pieces being found to be possible when the binding material is relatively stiff. While an apparatus embodying my invention is especially well adapted for the handling of a mass of concrete forming elements containing little or no excess of water, it will be understood that its use is not limited to the handling of such a mass. It is equally well adapted for the treating and handling of a mass containing a considerable excess of water in case such an excess is for any reason found desirable."

The invention therefore, not only makes the transportation and placing of this massive and unruly material possible, under all working conditions, but enables the contractor to use a minimum of the concrete weakening excess of water, without additional trouble or expense—possibly by the exercise of a little more skill and care.

The apparatus embodying the structural invention is defined variously in the claims. Of the claims involved in this suit, and in the Ulen suit (2, 4, 6, 17, 21, 22, 28, 34 and 35), claim 21 perhaps gives the best definition of the structural or apparatus invention. It reads:

> "21. In a device for treating and moving a mass of concrete forming materials, the combination of a chamber adapted to receive and contain the said mass, a discharge duct connected with the chamber, the said chamber having walls which gradually converge on all sides to the duct, and join the duct walls with substantial smoothness, means for supplying a fluid pressure agent to the chamber back

of a mass of materials contained therein, and means for directing a fluid pressure agent into the discharge duct in the general direction thereof."

Claim 2 is perhaps a little broader in some respects, particularly in that it is not limited to the walls gradually converging to join the outlet duct, but is more limited in that it specifies the separate air inlet pipe for producing pressure behind the mass, which claim 21 does not include. Claims 17, 34 and 35 also call for a separate top pressure means, but claims 4, 6, 22 and 28 do not. Claim 28 is perhaps the broadest apparatus claim on this point, specifying only "a pipe for delivering a jet of fluid pressure agent for propelling said concrete materials."

There are also other minor differences in the structural claims, but these need not be considered, since all these claims—and most of the other claims of the patent—*were embodied in petitioners' apparatus,* at least until the alleged disconnecting of the top air pipe, and apparatus claims 21, 22 and 28 were always embodied (Opinion 2nd, C. C. A., R. 347; Dist. Ct., R. 327).

The Method Claimed.

The invention also includes the method of handling concrete pneumatically which the apparatus, or other similar apparatus—facilitates. The apparatus, of course, must be employed in a certain way, or according to a certain formula, to produce the desired result, and this method or process of handling concrete so as to produce this remarkable result *is a distinct phase of the invention,* depending not on the particular apparatus but on the making of certain steps constituting a *method.* It is covered by a number of method or process claims, and is described generally in the specification, the operation being referred to on page 1, line 77 to page 2, line 99.

Some criticism of the process claims was attempted in

the Ulen suit, but this was disposed of by the District Court (Opinion, Ulen R. 401-2) with the statement that

> "The process claims are limited to *no particular form of apparatus* so that the contention that they are for a mere function seems without merit.
>
> *Expanded Metal* v. *Bradford*, 214 U. S. 366;
>
> *Buffalo Forge Co.* v. *City of Buffalo*, 255 Fed. 83."

(See discussion, Appendix, 129-137.)

The two method or process claims in this suit are 4 and 6. Claim 4, which is the broader, reads as follows:

> "4. The method of conducting concrete forming materials from a receptacle along a closed conduit connected therewith to the place where it is to be utilized, which consists in closing the receptacle, introducing compressed air behind the mass of materials and also behind the portion thereof lying adjacent the conduit, and thereby pushing the mass into and along the conduit."

Claim 6 refers more specifically to the materials as "a relatively compact and impervious *mass*," and refers to "injecting a jet of air under pressure into the *mass* at an angle to the line of movement of the *mass* into and through the said passageway."

These method claims, it will be seen, relate to the very essence of the invention. The invention is, primarily, a new *method* of handling concrete or similar materials, which consists essentially in transporting concrete by first applying air pressure behind a mass of it in a closed chamber to compact it and force it into the outlet thereof, then, at the same time injecting a velocity jet of compressed air into the portion of the mass packed in the outlet to dislodge it and the succeeding portions successively, and drive them along the conveying conduit to the distant point of placement.

This method was something new and entirely unprecedented in this or any kindred art.

There were two practices followed in the art of conveying materials pneumatically, and two only, viz.:

1. To feed the materials from a hopper in a small loose stream, usually by gravity, but sometimes with the aid of a limited air pressure to accelerate their gravitation and insure a complete discharge. The materials were so fed as to be dropped into a current or blast of air rushing through a large conveying conduit. The materials were loose and dry, or capable of being finely divided and floated in air like grain or sand. They gravitated from the hopper or vessel through a relatively *long narrow* downwardly extending pipe, and dropped into the air conveyor pipe in a *small stream*, which was taken up by a large air current in the delivery pipe, *disintegrated and floated*. This was known as the *flotation* or *kinetic* method.

Examples of this practice are found in the Farnham, Warren and Goldie patent, hereinafter discussed.

2. To make a column of *liquid* flow through a delivery pipe—sometimes with small solids carried therein—by simply putting air pressure behind it. This could not be done with dry materials on the one hand or solid or non-fluent materials on the other hand. It was practiced with *fluids* in various arts.

Examples of this practice are found in the Canniff and McIlvrid patents and the Smith 1872 "paper" patent. Canniff and McIlvrid used grout, a *liquid* mixture of sand, cement and water, which would flow like thin porridge. Smith proposed to make a *liquid* of concrete aggregates by adding *three-fifths* of the volume of water, and forcing the liquid by simple air pressure behind it. If it worked at all, it destroyed the value of the concrete mixture. That this proposed substance was a *liquid* is conclusively shown by the fact that he proposed to have it flow *by gravity* along through a narrow, winding passage (d)

from the mixer into the forcing chamber (F), and by the fact that he used a chamber with a *flat bottom* and a discharge pipe in the middle of that bottom. *Nothing but a liquid could be thus conveyed and flowed out of the chamber.* Furthermore, he *calls it* a "liquid" and a "fluid" which will "*flow freely.*"

None of these prior patentees conceived the idea of packing the mass of material by pressure behind it and forcing it into a contracted outlet, and there injecting into it in its packed condition a velocity jet to cut off successive portions and drive or "shoot" them through a long conveying conduit—like projectiles in an air gun, or a solid plug carrier in an air-tube conveyor.

The conception of this plan is what made the pneumatic transportation of concrete possible. It could not be floated in air, and if it could have been, such floating and disintegration would have destroyed the mixture, causing the large heavy aggregates and the fine lighter aggregates to separate and be delivered, if at all, not as a concrete mixture, but as separated masses of grout or "soup" and rocks. (See Ray, Ulen R., Exhibit D, 124-7 and R. 262-6.)

Judge AUGUSTUS N. HAND, in the District Court in the *Ulen* case, after a long trial, and again in the present case, after another long hearing, in the course of which the respondents' apparatus was actually operated, found that the kinetic discharge of concrete was *impossible.*

In the first suit he said, *inter alia,* referring to the earlier blowing, devices:

> "They were kinetic devices for floating light material." * * * It is not accomplished by a heavy air *pressure* as in the patent in suit, but by an air or *steam* velocity" (Ulen R. 397; 12 Fed. [2] 929).

In the second and present case, he says:

> "Moreover, if air were floating the concrete it

> would be bound to pass through the pipe and the pressure would be so rapidly reduced that the heavier portions would be left in the pipe."

And again:

> "As for the point raised that patents for kinetic devices are pertinent prior art, it is answered by *the fact* that neither the patent in suit nor the defendants' device are kinetic in operation" (R. 327).

As to liquid conveyance, it is simply out of the question. Even if concrete could be so conveyed it would have to be first immersed, and destroyed as concrete. Moreover, none of the liquid conveying apparatus employs the all-essential *velocity jet at the outlet.*

II.

HOW THE McMICHAEL INVENTION WORKS.

The invention operates in a peculiar and unprecedented manner, functions in a fashion considered impossible in the art, and produces a surprising and highly useful result which cannot be attained by any other means.

In the foregoing discussion of the invention as set forth in the patent its working has been described. It is therefore only necessary under this heading to call attention to the relation of this working to the important results attained. This may be summarized as follows:

1. As we have seen, the body of concrete is a mass of rocks with the interstices filled with a similar proportion of sand and cement, the whole intimately mixed and proportioned to secure an even distribution of all the aggregates throughout the mass. This is essential to the strength and usefulness of the concrete and must be insured by care and precision (Pat. p. 2, lines 108-122, R.

285 and Kirk., Ulen R. 50, Q54). After the concrete is mixed, its mixture must not be disturbed, but must be preserved intact.

Prior to the patent in suit, concrete was taken from the mixer and conveyed in barrows or cars and sometimes by other mechanical conveyors to the point of placement. This was done as quickly as possible, to prevent setting of the concrete before placement, and care was taken to insure against separation of the aggregates en route.

But concrete weighs about 150 pounds to the cubic foot or over two tons to the cubic yard and is not easy to handle, even in mechanical conveyors. Such conveyors, however, are still used for ordinary building purposes. It is also raised in a tower and distributed to various parts of buildings by means of steep gravity chutes or conduits, down which it slides, without separation, by gravity.

2. In tunnel work, however, the concrete must be conveyed great distances from the mixer, and placed between the rough wall of the tunnel—sometimes braced by rough beams—and a steel form set inside the rough tunnel and spaced usually from eight to twelve inches therefrom. The purpose is to fill in the rough wall of the tunnel, re-enforce it and present a smooth, even interior surface. This is called tunnel lining, and is necessary in practically all tunnel work on account of the uneven character of the bored and blasted wall, its weak spots and the frequent occurrence of water veins.

The forms used in tunnel work are as much as 120 feet in length, and are spaced a foot or less from the rough wall (Bateman, Ulen R. 116). *It is therefore impossible to do such work by hand,* as men cannot crawl in between the form and the tunnel wall and work. Nor can they work more than a few feet beyond their reach; and even at that, they cannot place the concrete in a satis-

factory manner where there are beams, or recesses in the tunnel wall, and the relatively feeble packing force exerted by human strength is insufficient even if the workmen are diligent and careful (Kirkland, Ulen R. 52-53).

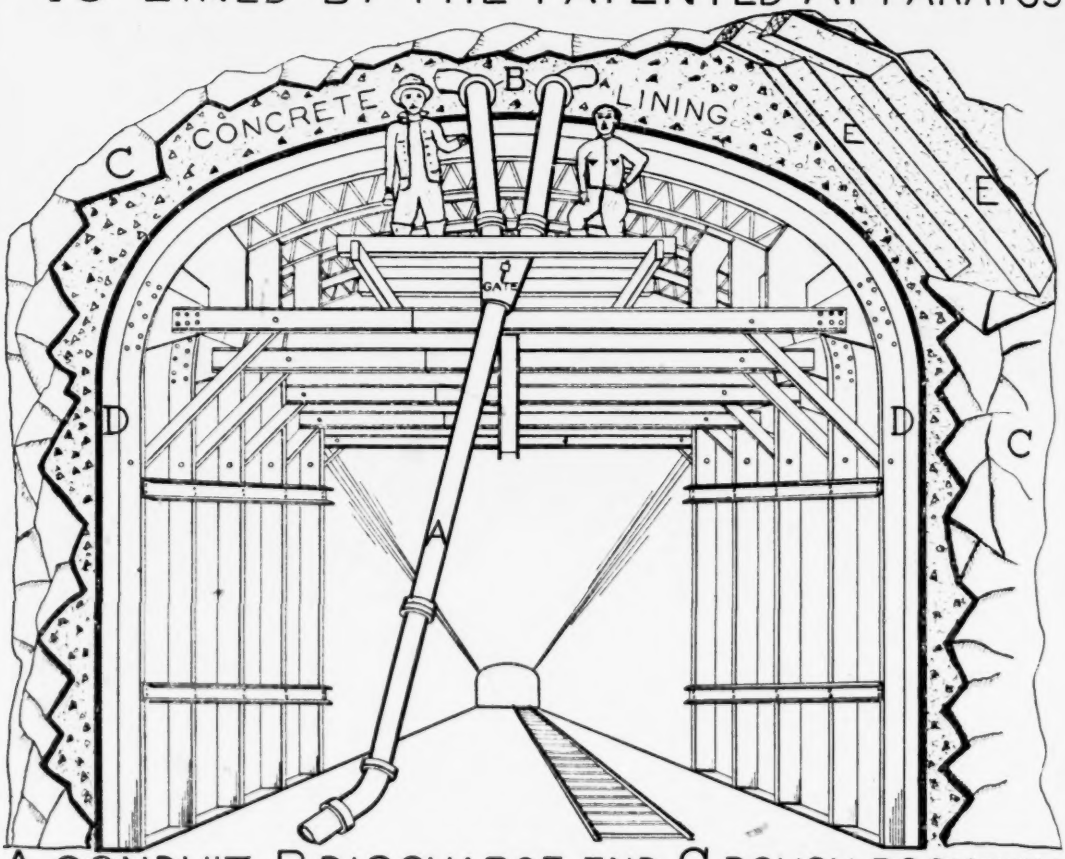
Mr. Kirkland says in part, referring to the work done by the patented apparatus (*Id.*):

> "Q64. Is it possible to produce that effect by human agency, by hand?
>
> "A. No, sir."
>
> * * * * * *
>
> "Q69. Then by hand can the concrete be placed properly behind the beams or other supports for the natural roof of the tunnel?
>
> "A. Oh, no; that would be impossible."
>
> * * * * * *
>
> "Q71. How about the expense?
>
> "A. The cost of placing pneumatically is, in ordinary tunnels, not done under air pressure, *from one-half to one-third* of the cost of doing it by hand or by other means."
>
> * * * * * *
>
> "Q99. But was it common to line tunnels with concrete prior to 1907?
>
> "A. Yes, sir.
>
> "Q100. Well, was there or was there not need for an effective means of lining those tunnels?
>
> "A. Yes, sir, the cost was very expensive" (*Id.* 57).

The expense of doing the work by hand in tunnels under air pressure was even greater and less effective (Kirk., Q3, R. 276).

The following cut shows the method of lining tunnels by the apparatus of the patent in suit, and is a drawing made from photographs of one of the C. B. & Q. Tunnels lined with it, Exhibit 6 (Ulen R. 185).

How a Tunnel Is Lined by the Patented Apparatus



A-CONDUIT B-DISCHARGE END C-ROUGH ROCK WALL
D-STEEL FORM E-BEAMS TO BRACE WALL

In this operation the concrete is shot from the distant mixer, through the conduit A, into the narrow, uneven space between the rough tunnel wall C and the steel form D, by means of the placing pipes B inserted between the said wall and form, until the entire space is filled with concrete. The form is then contracted and moved back, and another section filled. The workmen who manage the placing pipes are on a platform, outside the form, and shoot the concrete in through the placing pipes a distance from twenty to one hundred and twenty feet.

The terrific force of the concrete issuing from the placing tubes, *packs it solid*, so as to save tamping or working—which would be impossible here—and insures a solid concrete lining.

3. The concrete, as we have seen, is placed where it cannot be placed by hand, placed better than it possibly could be so placed and at one-half to one-third the cost of the inefficient hand-placing under the most favorable conditions.

The McMichael invention has saved many millions of dollars in tunnel work, has made such work possible where it could not otherwise have been done, and has protected human life and property, in every section of the United States, as well as in foreign countries.

The respondents admit this wonderful utility in the article published in the Engineering-News Record describing their work and inspired by them (Qs120 and 121, R. 217) and identified by them in answer to interrogatories (R. 10-20) where they say:

> "100 per cent. of the stuff that goes into the mixer is shot into the forms no matter how far the forms are away from the shooter."

And again:

> **"In short, concreting has been done where it could not be placed by hand; and the machines have produced better and more finished jobs."**

4. **With the patented machine the previously mixed concrete is compacted in the chamber by the pressure behind the mass, forced and packed into the outlet, cut off and shot any desired distance, to any ordinary elevation, around bends of the conveying conduit and delivered at the forms *intact*.**

The machine will discharge a yard, or two tons, of

concrete in *ten to twenty seconds*, and convey it at the rate of a *mile a minute* (Kirk., Ulen R. 49-52). The distance of conveyance appears to be almost unlimited. In one instance (Twin Peaks Tunnel, San F.) it was shot and placed 4900 feet, or nearly a mile. (*Id.*)

A reading of Mr. Kirkland's description of the wonderful performance of the patented invention (Ulen R. pp. 49-53) is earnestly recommended.

All these facts concerning the wonderful work of the invention are undisputed.

It seems almost a miracle that a workman without doing anything more than to open a little air valve, can hurl tons of concrete per minute great distances and to high elevations, around obstacles, and place them intact to form solid concrete, without any other effort.

III.

THE GREAT WORK AND UNIVERSAL USE OF THE INVENTION.

It has eliminated laborious, expensive and ineffective operations and accomplished work which could not have been consummated without it. Accordingly it has effected an enormous saving in all the work on which it has been employed and has made possible great enterprises which otherwise might have been unsuccessful.

The great usefulness of the invention has been in the construction of tunnels, bridges, and dams, where the nature of the work is such that it cannot be done, or cannot be done properly and safely, by hand or by mechanical means. **In this important field the apparatus and method of the patent in suit have solved a great and long standing problem, superseded all other means and gone into general use.**

The following résumé of the *undisputed* testimony as to its work and the unusual difficulties encountered in such work (see Kirk., Ulen R., Exhibit D, 48-53) will be sufficient on this point.

1. Concrete weighs about 150 pounds per cubic foot or two tons per cubic yard (Ulen R. 48).

2. This concrete must be transported distances up to a mile, around obstacles and to considerable elevations, and delivered *intact* to the forms. Illustrations are the Twin Peaks Tunnel, where it was shot nearly a mile, the Dennison Viaduct, Cleveland, where it was elevated eighty feet (strangely enough it is easier to transport the concrete upward than horizontally, *id.* Q47), and the petitioners' work in which it was shot 1100 feet, to an elevation of 67 feet and around as many as fourteen right angle bends in the pipe (Kennedy, R. 203).

3. A ton of concrete is discharged and sent on its way in a few seconds, at the rate of a mile a minute, or nearly 100 feet per second (Kirk., Ulen R. 51).

4. It must be transported and placed quickly, before it has a chance to set.

5. It must be driven home and packed so as to fill every space and crevice, and ram itself into solidity. This is done by the great momentum due to the weight and velocity of the concrete (*id.* Q63, p. 52).

6. It is impossible to do such work as this by hand (*Id.* Qs67-69).

7. Where the work *can* be done by hand the patented invention saves from one-half to one-third the cost (*Id.* Q71), and in some cases a much greater saving is effected (Q3, R. 276).

8. The concrete must be thoroughly and intimately

mixed, so that the rock is surrounded by the cement and sand and a homogeneous mixture produced (Ulen R. 50, Q54).

9. This intimate mixture must not be disturbed; and the patented apparatus does not disturb it but preserves it (*Id.*). It even tends to improve the mixture or make it more thorough on account of the internal agitation of the masses as they shoot through the conveying conduit (R. 111). There is also a mixing action in the chamber when the compressed air is first turned on and the air from the bottom jet shoots up through the mass to establish or equalize the top pressure (*Id.*).

10. Tunnels and similar works were commonly lined prior to 1907, *but at great labor and expense* (Kirk. Qs97-100, Ulen R. 56). There was therefore great need for the invention, and great difficulty in overcoming the obstacles in such work, some of which were unsurmountable.

The reasons why the invention has supplanted all other means in this work, and gone into general use, are therefore apparent. That it has gone into general use is established (Kirk., Q23, Ulen R. p. 45).

The novel character of the invention is shown by the fact that the greatest difficulty in inducing engineers to use it was that they first regarded it as *impossible, and even ridiculous*, until they saw it demonstrated (*Id.* Qs12-14 and 22, Ulen R. 44).

The merit of the invention has been generally acknowledged by manufacturers of concrete machinery, and the patent has been respected by them (Robinson, Ulen R. 66).

The following list of *some of* the important works on which the McMichael apparatus and method have been used will indicate its immense importance, and the great benefit conferred by it on the public. These are from the testimony of Mr. Kirkland (Ulen R. 46) and Mr. Rob-

inson for the respondent's licensee, the Ransome Company (*Id.* 65). A long list is given in the Ulen record (R. 187 and 191-2).

The Roosevelt Dam, Arizona.

Pennsylvania Railroad tunnels under New York Harbor.

Chicago (Wilson Avenue) water tunnel, extending eight miles out under Lake Michigan.

New York subways.

Twin Peaks tunnel, San Francisco.

Muscle Shoals Dam, Alabama.

Los Angeles and Salt Lake Railroad tunnel.

Southern Pacific, Union Pacific and C. B. & Q. Railroad tunnels.

Shandaken Aqueduct tunnel, fourteen miles under Catskills (by Ulen Co.).

Vehicular tunnels under New York Harbor.

Queensboro subway extension (done by Petitioners).

The invention has also been used in foreign countries (Robinson, Ulen R. 65-66).

The work mentioned was all prior to the trial of the Ulen suit in 1925. Since that date the extensive use has continued (Kirk. Q4, R. 276).

This wonderful success of the patented invention is not due to advertising or salesmanship. Engineers who have in charge great works involving enormous cost and upon which human life and property depend, do not take chances, or yield to the persuasion of advertisements or salesmen's talk.

The invention has succeeded by reason of its performance.

With these facts in view, his Honor, Judge A. N. HAND said in the *Ulen* case (Ulen R. 401):

> "His device has displaced all other methods for rapidly and economically conveying, lifting and placing concrete at long distances from the initial

> source of supply and has been used in numerous great enterprises. In such circumstances his claims should be read broadly and given a fair range of equivalents."
>
> *Concrete* v. *Ulen*, 12 Fed. (2) 929, 931.

And Judge SWAN, writing the opinion of the Circuit Court of Appeals in this case said, after referring to the patent in *Concrete* v. *Gomery*, 269 U. S. 177, in which the apparatus of the patent was merely an adaptation which had been made before, in substance:

> **"But that is a very different situation from the one before us in the Ulen Case where nobody before McMichael had ever used a pneumatic apparatus to transport concrete." (R. 344.)**

This fact taken with the fact that the patented apparatus has gone into universal use (Kirk. Q23, Ulen R. 45), shows the true character of the invention.

IV.

The original specification of the application fully disclosed the invention of the patent. The claims and the amplified disclosure of the patent are also supported by a supplemental oath.

The facts which establish this point may be summarized as follows:

1. The drawing of the McMichael patent in suit is the identical drawing which was filed with the original application therefor. Not a line, and not even a reference numeral, has been altered.

2. The original specification of the application described the construction and operation of the apparatus with sufficient fullness "to enable any person skilled in

the art" (U. S. R. S. 4888) to make and use the same. Any person following the original drawings and specifications would have made *a practical, fully operative apparatus,* embodying the improvements, and would have realized the invention, as to both the apparatus and the process.

3. The additions to the description merely made it fuller and gave a better explanation of the operation and great usefulness of the invention, so that persons, skilled in the art, *could better realize and take advantage of its great usefulness for concrete.*

4. The original object of the invention was stated with sufficient clearness in the following language:

> "The invention has for its object to provide an apparatus for elevating and transporting material of the character mentioned, in a more expeditious manner and with greater facility than is possible by the employment of ordinary methods" (File Wrapper, Ulen R. 199).

The mention of ordinary *methods* shows that the original specification writer intended the public to understand that the invention had to do with a method, as well as a mechanism.

5. The original description specified "*concrete*" as a "building material" which the invention was designed to elevate and transport. The fact that McMichael contemplated transporting other material, "such as sand, plaster, mortar," *as well as concrete,* and so states, does not in any way narrow the invention. Rather the elimination of these other materials made his invention, as finally described and claimed, *more limited and specific* than the original disclosure. The inference is that he found that his invention was peculiarly adapted for the handling of concrete, but not for the handling of these other materials and, therefore, limited and restricted his improve-

ments to apparatus for handling *concrete alone*. It may be that he found his improvements *not well adapted* for the handling of sand, plaster and mortar and, therefore, cancelled reference to these materials. Whether it will handle these materials or not is, however, immaterial. If the method and apparatus differ from earlier methods and apparatus, and operate in a different manner to produce a useful result, *it makes no difference what materials are operated on*. Nevertheless, the fact that they will elevate and transport concrete, proves that there was a great difference, in view of the fact that this material *had never been transported pneumatically before*, and has since been *universally* transported by the invention to secure wonderfully beneficial results.

6. The claims of the original application also covered the apparatus as described and claimed in the final patent. **There was no abandonment of any part of the invention in the Patent Office.** On the contrary, the invention originally claimed was adhered to and claims defining it insisted upon throughout.

The application shows numerous actions, arguments and amendments, an interference proceeding, a lapse and renewal after allowance and changes in ownership, so that it was pending in the Patent Office for eight years. **During this period, however, the invention was steadfastly adhered to.**

Thus Claim 2 of the patent is for substantially the same subject-matter as Claim 3 of the original application, and remained in the application, with only small changes in form from beginning to end. This claim is one of the apparatus claims involved in this suit. It reads—

> "2. In combination, a chamber for containing concrete forming materials, a conduit leading therefrom, a compressed air inlet pipe connected to a part of the chamber remote from the conduit, and

> another compressed air inlet pipe leading through the chamber wall and terminating within the chamber near the opening into the conduit in a nozzle directed toward said opening."

Claim 3 of the original application (Ulen R. 202) reads as follows:

> "3. In an apparatus for elevating and transporting granular and plastic building material, a receiver having its lower portion in the form of a hopper, means for supplying air under pressure to the upper portion of the receiver, a tube connecting with the lower end of the hopper to convey the material therefrom, and an air pipe to deliver air at the lower end of the hopper, substantially as described."

It will be seen that these claims are substantially the same in substance and meaning, and that they differ only in small details.

About two years after the application was filed it became involved in an interference, and the subject-matter of this claim was included in the second claim, Count 2, of that interference in the following language (*Id.* 215):

> "Count 2: In combination, a chamber for containing plastic concrete, a conduit leading therefrom, a compressed air inlet pipe connected to a part of the chamber remote from the conduit, and another compressed air inlet pipe leading through the chamber wall and terminating within the chamber near the opening into the conduit in a nozzle directed toward said opening."

The interference was decided in favor of the present patentee, McMichael, and this claim remained in the application, which was allowed (Ulen R. 277), permitted to lapse and finally renewed in January, 1911, within a year after its allowance.

On the renewal, the specifications were amended, and new claims added, but the four claims in the application on its original allowance, *including the claim above quoted and the two method claims*, were retained (Ulen R. 266).

Thereupon numerous objections were made by the Patent Office to the *new* specifications and claims (Ulen R. 233), and a new oath as to Claims 1 and 4 and some of the new claims required. The claims formally allowed were neither objected to nor rejected on the merits and remained in their original form. One of the originally allowed method claims read as follows (*Id.* 215):

> "4. The method of conducting freshly mixed concrete from the mixer along a closed conduit connected therewith to the place where it is to be utilized, which consists in closing the mixer, introducing compressed air behind the mass of concrete and also behind the portion thereof lying adjacent the conduit, and thereby pushing the concrete into and along the conduit."

It is the original form of Claim 4 of the patent and corresponds in scope and substance to that claim, which is apparently the broadest of the method claims in the patent.

Amendments, arguments and official actions thereupon followed, but Claims 2 and 4 above quoted were not rejected, and were amended slightly in language only, *without changing their scope or meaning* (Ulen R. 259), and finally were allowed with the other claims in the patent in 1914 (Ulen R. 278).

Claim 2 of the patent is therefore substantially Claim 3 of the original application. It was never really rejected, was only canceled on the substitution of a claim of the same scope and meaning (Amdt. April 5, 1909, Ulen R. 213), and slightly amended to make it more clearly define

the invention, voluntarily and without any requirement on the part of the Patent Office.

The "2d" claim rejected by action of February 4, 1908, was the *original* second claim which had been renumbered 1 (see Amdt., Ulen R. 299), and not Claim 2 of the patent or its predecessor, which was originally *Claim 3* and was renumbered 2 (Ulen R. 208). It is true that in action of March 9, 1909 (*Id.* 211), the Examiner said at the end of the letter: "The claims are all rejected," but as he immediately followed this up with a declaration reciting that claim in substance and holding it *"allowable,"* this general rejection had no effect (Act'n Mar. 25, 1909, *Id.* 212). And when the applicant promptly adopted this claim as formulated by the Examiner, on April 5, 1909 (*Id.* 213), it became an allowed claim in the case.

It will be noted that Claim 4 of the patent, for the method, had its origin in the four allowable claims formulated by the Examiner and suggested to the applicant on March 25, 1909, the applicant being "limited to twenty days in which to file them" (*Id.* 212). So that from March, 1909, to the final allowance of the application, *these two important claims for the apparatus and the method were in the application and held allowable*, were never rejected at any time on the merits, and were only slightly amended by the applicant to clarify them or make them more specific. In fact, the only objection of any kind made to them was that they should be supported by a new oath.

The other apparatus and method claims involved in this suit appear to be for substantially similar subject-matter as Claims 2 and 4, and are therefore embraced within the scope of these claims.

7. **Even if new matter was added to the application, it was covered by McMichael's supplemental oath filed February 17, 1912** (Ulen, R. 241, 251-3). This oath quoted Claims 4 and 6 of the patent, recited Claim 2 of the patent,

in substance (see Fourth, Third and Second quoted claims respectively), and recited nine other claims containing the substance of all the claims of the patent. (See First and Fifth quoted claims.) In the oath he swears that this subject-matter originally

> "* * * was part of his invention, was invented before he filed his original application, above identified, for such invention, was not known or used before such invention, was not patented or described in a printed publication in any country more than two years before his application, was not patented in a foreign country on an application filed more than twelve months before his application, was not in public use or on sale in country for more than two years before the date of his application, and has not been abandoned" (*Id.* 251).

The claim, therefore, that any part of the invention—either method or apparatus—was improperly added to the application is wholly without merit.

The only objection to new matter in a patent application is under the section of the patent statutes (U. S. R. S. sec. 4892) which requires that,

> "The applicant shall make oath that he does verily believe himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition or improvement for which he solicits a patent; that he does not know and does not believe that the same was ever known or used; and shall state of what country he is a citizen."

And, if any matter, added to the application, after it is filed, is not fairly disclosed in the original application and covered by the original oath, it may fail to comply with this section. Therefore, it is customary, where any question has been raised, to file a supplemental oath covering such alleged new matter. *This McMichael did;* and, in doing so, he removed all question concerning

either the apparatus or process claims of the patent. **It is significant that this supplemental oath is not referred to in any way in the extended arguments of petitioner concerning the alleged new matter in the McMichael patent.**

That the original specification was brief, and did not go into the theory of construction or operation in detail is entirely immaterial.

It frequently happens that an applicant when he files his original application *does not fully understand the principles involved,* and it is the rule with most really new inventions that their full nature and purport are at first not understood. It is well within the rights of an inventor to more fully explain and elucidate, and even elaborate, his original disclosure, so long as he does not inject thereinto claims not fairly readable on his original disclosure.

Thus in *Diamond Rubber Co.* v. *Consolidated Rubber Tire Co.*, 220 U. S. 428, 435, this Court said:

> "A patentee may be badly empirical, seeing nothing beyond his experiments and the result; yet if he has added a new and valuable article to the world's utilities, he is entitled to the rank and protection of an inventor. And how can it take from his merit that he may not know all of the forces which he has brought into operation? It is certainly not necessary that he understand or be able to state the scientific principles underlying his invention, and it is immaterial whether he can stand a successful examination as to the speculative ideas involved. * * * (Citing numerous cases.) * * * He must, indeed, make such disclosure and description of his invention that it may be put into practice. In this he must be clear. He must not put forth a puzzle for invention or experiment to solve, but the description is sufficient if those skilled in the art can understand it. This satisfies the law,

> which only requires as a condition of its protection that the world be given something new and that the world be taught how to use it. It is no concern of the world whether the principle upon which the new construction acts be obvious or obscure, so that it inheres in the new construction" (55 L. Ed. 527, 530).

And in *Cleveland Foundry Co.* v. *Detroit Co.* the Circuit Court of Appeals for the Sixth Circuit said (131 Fed. 853-857):

> "It is true that the patentee did not fully perceive nor correctly perceive, as we think, the principles on which the operation of his burner proceeded. For instance, we more than doubt whether he appreciated that the principle of gravity cooperated in the method of his invention. But he did see and know that the burner he had devised would successfully accomplish the results he anticipated and was laboring for. *It is clear enough that while the application was pending he came to understand the operation of his device better than he had, and that his first claim was founded on that better understanding.* These are the essential facts on which the issue as to whether such new matter was brought in and claimed as would defeat the validity of the claim must be tested. We think the issue must be determined in favor of the patent. In the case of Michigan Central R. R. Co. *v.* Consolidated Heating Co., 67 Fed. 121, 14 C. C. A. 232, we had occasion to consider the question of the validity of amendments made while the application for a patent was pending. We there held that the validity of such an amendment depended upon the question whether it brought in original matter, *or was of something that might be fairly deduced from the original application.* In the first instance the amendment would not be justified; in the latter it would. The case was decided upon that distinction. And this is the rule which is elsewhere recognized. Hobbs *v.* Beach, 180 U. S. 396, 21 Sup.

> Ct. 409, 45 L. Ed. 586; Western Electric Co. *v.* Sperry Electric Co., 58 Fed. 186, 7 C. C. A. 161; Sugar Co. *v.* Yaryan Mfg. Co. (C. C.) 43 Fed. 140. This distinction harmonizes with the doctrine that the benefit secured by an invention extends to all the uses of which it is capable, whether the inventor had them all in contemplation or not, and the other rule, to which we have already referred, that it does not matter that he does not understand the principles on which his device operates. If he discovers new uses to which his invention may be put, *or discerns the principles thereof more clearly, while his application is pending,* in neither case is there any new invention, nor any enlargement of the old. And that being so, there can be no legal objection to his so molding his claims as to secure all his invention discloses."

See also:

Schaum, et al. v. *Copley-Plaza Co.*, 260 Fed. 197, 201 (affirmed by 1st C. C. A., 269 Fed. 140);

General Electric Co. v. *Cooper Hewitt Co.* (C. C. A., 6th), 249 Fed. 61, 64;

General Electric Co. v. *Morgan Gardner Co.*, 168 Fed. 52;

De la Vergne Co. v. *Featherstone*, 147 U. S. 209, 229 (distinguishing *Eagleton Co.* v. *West Co.*, 111 U. S. 490, 498).

And the Second Circuit Court of Appeals in *Westinghouse* v. *Metropolitan*, 290 Fed. 661, adopted the same rule, in a very carefully considered opinion, the gist of which is stated in the following language (665):

> *"Result is that a claim fairly derivable from a sworn disclosure is good, whether originally presented or introduced by amendment; and such claim needs no supplemental oath."*

The Court has even held that claims deliberately

omitted from a reissue application, and thus expressly "abandoned," may be reinstated in a second reissue.

> *Autopiano Co.* v. *American Player Co.*, 222 Fed. 226.

And in all the cases above cited on this point, except the last, which related to a reissue, *there was no supplemental oath,* whereas in this case there *was* a supplemental oath expressly covering the subject-matter of the broader claims in the patent.

The Decision of His Honor Judge Learned Hand, Shows That the Objections That New Matter Was Inserted and That the Original Invention Was Abandoned Have No Merit.

In deciding these questions on the hearing of these segregated issues (see Opinion, Ulen R. 13), Judge HAND said, on the question of abandonment, that the defense rested upon a *misconception of the authorities* referred to, which establish two doctrines not related thereto. He said (*Id.*, R. 14):

> "The first doctrine is that on reissue no claims can be inserted which had been made and rejected in the original application. The second is that in the interpretation of claims a patentee may not insist that they shall be read as equivalent to claims in whose rejection in the Patent Office he acquiesced. *Neither of these doctrines has anything at all to do with claims which have been once rejected and in substance resolicited and allowed while the application is still pending.*"

He then goes on to say that an applicant may amend his claims as often as he pleases while the application is still pending, and then says (*Id.*, R. 15):

> "The patent is *in fieri* until it is allowed; the proceedings, * * * are negotiations between

> two contracting parties, till their conclusion open to modification by either side. When the bargain is struck the patent issues and the claims are frozen, but not before."

The objection based on the alleged absence of a supplemental oath to new matter need not be considered, since the patent contains no new matter, and a supplemental oath *was* filed as to matter which the Examiner thought was new, but without admitting that such matter was new in fact (*Id.*, R. 241). Judge LEARNED HAND, however, overrules this objection on the authority of *Westinghouse* v. *Metropolitan*, 290 Fed. 661.

THE NON-OBVIOUS CHARACTER OF THE INVENTION.

That the applicant had difficulty in making the Patent Office understand the true nature of his invention, and that it was also doubted by practical workers in the art, who required evidence of successful use and demonstration, only goes to show that the invention was unusually obscure. In this case the applicant found it necessary to file with the Patent Office a description and illustration of the working of the invention published in "Engineering News" showing the construction therewith of the La Salle St. tunnels, under the Chicago River (Ulen R. 249); and, as we have seen, Mr. Kirkland and other engineers thoroughly experienced in concrete work, including concrete tunnel work, refused to believe that the handling of concrete pneumatically was possible (Qs12 and 22, Ulen R. 44 and 45).

A similar case is that of the Ashmore & Morgan patent for the well known concrete roller and process for finishing concrete pavements which was sustained in *Macon Concrete Roller Co.* v. *Brooks-Callaway Co.*, 272 Fed. 341

(affirmed 279 Fed. 114). In his very able discussion of the invention Judge SIBLEY says (272 Fed. 344):

> "The conception was new. The practical contractor to whom it was first presented very emphatically expressed his contempt of it. The Examiner of Patents in his first letter of May 2, 1916, rejecting the claims said:
>
> "'The action of the roller is believed to be inconsistent with the applicant's insistence upon the lightness of the roller.'
>
> "Only by the exhibition of numerous testimonials to the actual performance of the method and device was approval secured."

The File Wrapper here shows, however, that the inventor fully understood the true nature of the invention, and its mode of operation during the prosecution of the application in the Patent Office. This is established by the various statements made by his attorney during the prosecution of the application and in his arguments distinguishing it from earlier patents cited. Thus, in the argument filed March 29, 1913, McMichael's attorney, referring to the Smith patent (Ulen R. 299), which belongs to the same general class as the other prior patents hereinbefore discussed says (R. 267):

> "The Smith apparatus is constructed for handling light grain which can be and, in his case, is handled largely by the action of air *circulating in and through the interior of the mass* to act separately on each grain berry to engage it and push it along. The action in the Smith apparatus can be described as the suspension of relatively small light particles in a large and relatively slowly moving body of air. In applicant's case the materials to be handled, instead of being light separate bodies such as grain berries, are large heavy bodies such as pieces of rock which are mixed with finer sand and cement

> particles and also with water which causes the whole mass to cohere and to become more or less solid and impervious. The air can act *on the mass* only by pushing bodily against *large portions* of it and *not by acting separately on the individual particles which comprise the mass.* In considering these claims the Examiner is asked to bear this distinction very clearly in mind."

Here we have a clear statement of the peculiar operation of the patented apparatus and method in acting upon the material *as a mass* instead of breaking up the mass, and in handling the entire mass *bodily* instead of circulating through and disintegrating the mass and acting on the separate particles. This is what the claims call for and what the apparatus is designed to do, and what no other apparatus even sought to accomplish.

Appellee's witnesses describe this action in their testimony, and it is fully explained by appellee's expert, who emphasizes the point that in the apparatus of the patent the material is not disintegrated or separated into its particles, as is the material handled by the earlier patents, but is handled *as a mass,* forcing it into and along the conduit substantially intact (Ray, R. 262-4, and Q7, Ulen R. 127-121).

The reason why this must be done is that if the concrete mixture of rock, sand, cement and water were broken up, the larger elements would separate from the smaller, and the materials would be entirely separated (*Id.,* R. 261, Q24).

There is, of course, a certain degree of *internal* mixing of the elements in each little cylinder or sub-mass of concrete, which tends to more thoroughly mix them as they travel along the conveying conduit at high speed and under pressure, and are acted upon by the friction of the conduit walls. This is the "mixing" referred to in

the patent (p. 3, lines 120 *et seq.*), where it says that the bend in the pipe

> "also slightly checks the advancing mass or sub-masses to assist in preventing the water or other ingredients from separating from the general mass because of difference in specific gravity" (Spec. p. 4, lines 8 *et seq.*).

Mixing, however, is expressly disclaimed in the present patent (p. 3, lines 99 *et seq.*).

It may be that the patentee did not fully understand that the jet at the outlet would be required *in all cases or at all times*, and this may be the reason for the statement in the original specification that

> "To loosen the material at the lower end of the hopper should the same become packed, I provide the additional air pipe adapted to discharge air through the material" (Ulen R. 201).

It is quite apparent, however, that before the prosecution of the application had proceeded to any extent he fully understood that the air pressure behind the material to pack it and the jet at the outlet to detach and boost separate sections of it were necessary—except possibly where the material was discharged down hill—and that their automatic and constant co-action were essential to the operation of the device.

That McMichael from the beginning understood and intended to insist upon the radical difference between his method of conveying such substances as concrete in mass, and the prior air floating and liquid flowing devices, is shown by his first argument in the application. Thus, in the argument of June 18, 1908, he refers to the former as showing "elevating means which depends upon the *current of air carrying* the material along," and in speaking of the latter says that it, "although suitable for *liquids*, is obviously not to be employed for elevating mixed concrete material" (Ulen R., Exbt. D, 206).

V.

THE PRIOR ART.

There is nothing in the prior art that could have taught any one how to make and use the invention. The marked departure of the invention over the art is emphasized by comparison.

The heavy, rocky, homogeneous material known as plastic concrete could neither be floated on a blast of air, nor caused to float by gravity or pressure like a fluid. Nor could it be broken up or unmixed or mixed with a body of water for transportation. Its character and requirements made it necessary that it be conveyed and placed substantially intact. Here was an apparently insoluble problem, and although various other materials had been conveyed pneumatically for at least thirty years, and the desirability of pneumatic conveyance of concrete was well recognized (see Smith 1872 patent), up to the time of McMichael's invention no means for doing it had been devised.

Thirty prior patents have been used by the petitioners-defendants in an attempt to anticipate the McMichael invention, part of them being found in this record and part of them in the Ulen record, which was introduced in evidence by the petitioners as Exhibit D (R. 31). *Their very number indicates their weakness.*

All of these prior patents, as we have seen, are included in two distinct classes:

1. Patents for air flotation or kinetic apparatus and methods in which the material is *disintegrated* and *floated* in a current of air.

2. Patents for causing fluids to flow under pressure in a column.

Of the patents finally relied on here by the petitioners, the following are flotation or kinetic:

Beach, No. 267,318 of Nov. 14, 1882 (R. 305);
Farnham, No. 747,396 of Dec. 22, 1903 (Ulen R. 347);
Warren, No. 671,303 of Apr. 2, 1901 (Ulen R. 329);
Goldie, No. 707,840 of Aug. 26, 1902 (Ulen R. 335);

and the liquid column patents are:

Smith, No. 122,497 of Jan. 2, 1872 (R. 297);
Smith, No. 122,498 of Jan. 2, 1872 (R. 300);
Caniff, No. 873,345 of Dec. 10, 1907 (R. 318);
McIlvrid, No. 958,421 of May 17, 1910 (R. 323).

The patent in suit belongs to a third and distinct class, not found in the prior art, in which neither air flotation, nor liquid column movement is employed, but in which concrete or the like (90% insoluble solids) is first placed under pressure behind a mass of it in a vessel, and thus compacted and forced into a narrow outlet, and then cut off and shot through a conveying conduit by air pressure applied at this outlet and behind its masses.

The Beach patent No. 267,318 of November 14, 1882 (R. 305), shows a "pneumatic conveyer" for conveying "*grain, flour, etc.*" (R. 307, line 23), which consists of bins EE, with small bottom outlet pipes leading to a common small outlet pipe F, through valves R, discharging into a "pipe, tube or box G" (R. 306, line 36), which has an "open end" communicating with an air reservoir A, and which is "filled with air, either by free communication with the surrounding atmosphere at its natural pressure,

or with air condensed to any degree of elasticity required" (*Id.*, line 31).

The grain, flour, etc., flows by gravity or by pressure, or both, from the reservoir A, through a small outlet pipe to the pipe, tube or box G, where it is carried "while in a state of *suspension in the air* in the tube" (*Id.*, line 16) to an exhaust apparatus—suction box—K. The operation is described as follows (R. 307, lines 29-35):

> "*The grain and flour or other article* thus introduced into the moving current of air will rush with the current *in suspension* through the tube G with that velocity with which air under great pressure will seek to fill a vacuum, which vacuum will at all times be maintained, as nearly as practicable."

The apparatus is distinctly one for floating grain, flour and other light, dry, finely divisible materials in a current of air to a suction or vacuum chamber. *The bottom jet at the discharge opening of the chamber and the other essentials of the patent in suit are entirely lacking*, and the apparatus is entirely incapable of handling any such substance as concrete, *in any manner*. It can operate entirely by suction, which means at most a pressure less than 15 pounds (Ray R. 274).

The Farnham patent No. 747,396 of December 22, 1903 (Ulen R. 347), shows a "*sand-blast*" apparatus, or in other words, an apparatus for producing *a blast of sand carried in a current of air*, for cleaning or other purposes. The sand is first placed in a tank 1 with a flat bottom and a small, downwardly extending discharge-pipe 2 in the middle of this flat bottom. At the lower end of this small discharge-pipe there is a "sand carrying hose 6 of any desired length to lead to the point of application of the

sand blast" (Spec., p. 1, line 75), and "an air-blast pipe 7" with a

> "nozzle or jet 11, which enters the coupling, so that its point of discharge will lie *below the discharge-mouth of the discharge-pipe 2*, leading from the tank, the best results being obtained when its point of discharge is *about midway* of the discharge-mouth of the discharge-pipe" (*Id.*, lines 92-98).

The patent says that

> "the sand will pass from the reservoir or tank *by gravity alone* or by gravity aided by compressed air within the reservoir under regulation" (*Id.*, lines 17-20).

The specification points out that by positioning the air blast nozzle midway of the discharge-mouth

> "the air is projected *across the mouth* of the discharge-pipe 2 without the blast passing up into the discharge-pipe and at the same time creates *a suction* across the discharge-pipe and down through the same, so that the downflow of the sand through the pipe is greatly facilitated" (*Id.*, line 100, etc.).

The specification further states that if back pressure were not prevented by this suction

> "it would not only retard the downflow of the sand, but it would also result in the sand becoming *moist* from condensation of the compressed air, *and thus the pipe would become clogged*" (*Id.*, p. 2, line 9, etc.).

It is also stated that

> "The inclination of the coupling at the lower end of the discharge-pipe also aids in the rapid flow

of the same from the mouth of the discharge-pipe" (*Id.*, line 15, etc.).

It is distinctly a device for conveying dry sand to make a blast by air flotation, the sand being discharged from the tank by gravity aided by suction and perhaps a limited pressure of air in the tank which "may be entirely cut off from the tank" (*Id.*, line 25).

The features which make it entirely unuseable for anything but dry, finely divided material are the following:

The tank with flat bottom;

The long narrow outlet pipe;

The absence of a velocity jet at or near the tank outlet;

The positioning of the blast and suction midway of the discharge-mouth of the outlet pipe, and

The small caliber of the pipes employed.

It was never intended to be used for any such substance as concrete and could not be so used. Its teachings would have *misled* anyone seeking to solve McMichael's problem and taught him to attempt the use of suction, disintegration and flotation—and failure.

The Warren patent No. 671,303 of April 2, 1901 (Ulen R. 329), is for another sand-blast apparatus which is called "mixer for sand-blast apparatus."

Like the Farnham patent it shows a reservoir or hopper A with a small discharge-pipe D at its bottom through which the materials pass from the reservoir to a chamber E in a pipe G through which a current of air passes. As in both Beach and Farnham, the finely divisible material is fed through a discharge-pipe in a *small stream* into the air pipe, when it is taken up and floated along by the air. The Warren patent says (p. 1, lines 63-71):

"The operation of the device is as follows: Air is admitted through the pipe G into the chamber

> E, and the valve F being open permits sand to pass from the hopper through the pipe D into the chamber and into the blast of air, *with which it mingles and by which it is carried through the chamber into the flexible tube M and discharged through the nozzle O.*"

It is another flotation device in which the fine material mingles with the air and is floated along by it. In this and the two preceding patents there is *no pressure nozzle at the outlet, no combination of pressure behind and at the front of the mass, and no operating upon the material as a mass.* The plan in all of them is to *distintegrate and float* the loose material, which is *the antithesis* of the patent in suit.

The Goldie patent No. 707,840 of August 26, 1902 (Ulen R. 335) shows another apparatus for propelling finely divided material—in this case dry cement or cement mixed with sand—in a state of disintegration in a blast of air. The apparatus consists of a "funnel" 16 with a small discharge-pipe at the bottom, extending downwardly, and through which the material must flow *by gravity alone* to a point where the

> "steam-pipe 17 projects into the interjector-pipe or hose 13,"

with which the outlet-pipe is connected (Spec., p. 2, line 123).

This steam-pipe takes up the small current of dry materials, and blows them through the pipe or hose 13 to a space under railroad ties, where they are supposed to set and reenforce the ballast. A small water pipe 20 may be used to moisten the cement and sand, which is properly proportioned will form a sort of grout.

There is no pressure behind the mass in the funnel, *and none possible or intended,* and the dry cement powder, mixed or unmixed with sand, must find its way down the little pipe in a loose state, where it will be inflated, moistened and driven to its destination in the steam or air from the pipe 17. It appears to be a purely chimerical scheme. To attempt to handle anything like concrete in this manner would result in nothing but failure and discouragement.

These patents do not teach the use of a pressure jet "within the chamber near the opening into the conduit" or "within the discharge duct" as the claims of the McMichael patent specify, and as petitioners have copied. They teach the use of a jet or a blast of air at a point distant from the opening or outlet between the chamber and the discharge duct. The air has no influence on the material in the outlet or "opening into the conduit" from the chamber.

The petitioners have located their jet in this opening, exactly where the patent places it, and where it must be placed to be operative. They have therefore followed the patent in suit and not the prior art, well knowing that the difference is the difference between failure and success.

The Court of Appeals for the Second Circuit after considering the prior patents and finding that **"nobody before McMichael had ever used a pneumatic apparatus to transport concrete,"** says (Opinion, R. 344):

> "The Warren and Farnham sand-blast machines (patents No. 671,303 and No. 747,396) could not have been so used without increasing the size of the discharge pipes and cutting off the sand-blast nozzles. **To do this was to make a new machine,**

> **and one who thought of doing it would have had a new and inventive idea; that is, that of blowing concrete, which had not been done before. When that is so, the physical change in the apparatus need be very little to sustain a patent.** The only reason why a new use is not patentable is that the law grants patents only for new things, not for new ideas. Similarly Goldie's machine (patent No. 707,840) for blowing cement could not, so far as appears, have been used as it stood for concrete, and never was so used."

The Smith patents No. 122,497 and No. 122,498 of January 2, 1872 (R. 297 and 300), purport to be for improvements in concrete pavements, and machinery for same, but are evidently for *a crude and worthless idea.* They are what are commonly called *"paper patents,"* and gave the art no solution *or practical suggestion of a solution* of the problem of conveying concrete pneumatically.

The first Smith patent is for concrete consisting of a mixture of concrete aggregates with a "quantity of water equal to about *three-fifths of the entire mass* of materials already commingled" so that "the whole is of a *fluid* character capable of *flowing freely* through pipes and of being run into covered molds" (R. 297, col. 2, lines 7-14). It is evidently the result of the *ignorance* of the nature and requirements of a concrete mixture. Such a freely-flowing, fluid mixture *would not form concrete, but a crumbling mass,* with the stone or gravel largely separated from the cement and sand. No such fluid mixture as this could be used to form concrete.

The second Smith patent shows a mixer for this liquid "concrete," from which the liquid mixture is supposed to flow by gravity, *through a winding, narrow passage d*

into a flat-bottomed forcing chamber F, from which the liquid will flow by gravity or by air pressure on to a roadbed. The outlet from the chamber F is *in the middle of the flat-bottom.* Therefore, only a *thin liquid* could be properly fed to chamber F and discharged therefrom. Furthermore, there is *no jet at the outlet or anywhere else.* The patent therefore lacks *the most vital and essential feature* of the patent in suit.

The Smith patents, instead of tending to anticipate the patent in suit, emphasize its novelty. They show that at least *thirty-five years* before McMichael solved the problem, the provision of means for pneumatically conveying concrete *was sought;* and that it was not found, despite the presence of numerous—probably hundreds—of inventors with this problem in mind during that period of thirty-five years.

In fact, the Smith patent was never heard of for more than *fifty years,* and until these petitioners, after appropriating the invention of the patent, sought an excuse for it.

The Smith patent taught the art nothing for thirty-five years, and never would have added anything to the sum of practical human knowledge.

The Court of Appeals for the Second Circuit in disposing of this Smith patent said (R. 344-5):

> "The new evidence of the patent art upon which appellants rely to distinguish the Ulen decision includes two patents granted in 1872 to W. H. Smith. No. 122,497 is for an improvement in concrete pavements and claims concrete 'prepared for use in a liquid or semi-liquid condition, capable of flowing in pipes and running into molds.' No. 122,498 discloses a machine for mixing liquid concrete and

conveying it by a discharge pipe from the mixer to the spot where it is to be laid. The concrete is to flow through the discharge pipe by gravity, or as an alternative, after flowing by gravity through a small winding passage into a chamber, F, is to be forced into the discharge pipe by the passage of steam or compressed air admitted into the chamber above the mass of the concrete. The chamber has a flat bottom of large area relative to the size of the discharge pipe, the outlet of which opens into the center of the bottom. While this machine discloses the idea of forcing concrete through a pipe by compressed air, *whether it was practically operable may well be doubted.* It would seem that a large quantity of the concrete, or at least the stones of which it is partly composed, would necessarily accumulate upon the flat bottom of the chamber. *In any event, it was very different from McMichael's device, which injects air into the concrete at its entrance into the discharge outlet. It cannot be regarded as an anticipation.*"

The Canniff and McIlvrid patents are merely for machines for discharging grout, a thin liquid, composed of sand, cement and water, which is forced in a column through pipes, like any liquid. They also lack the vital and important element of the bottom jet.

The Kolsche German patent No. 18,394 of 1881 (*Concrete* v. *Storrie*, Exhibit Book, pp. 183 and 658), regarded as an anticipation in the *Storrie* case (No. 528 here), is merely another *flotation* patent showing an apparatus for conveying "granular material" such as "slack" (usually coal-screenings—Stand. Dict.), "sandy or granular material *by means of a current of air.*"

It was *pleaded* by the defendants in this case (R. 6) and by the defendants in the *Ulen* case (Exhibit D, p.

9), but was evidently not considered of sufficient importance to warrant its being offered in evidence or discussed. It shows a kinetic device, and one in which light or finely divisible material is floated and driven along by a current of air produced "by means of a blower." The current, as usual, is merely "of such strength that the *particles dropping* down through the opening c.d. are engaged and carried along through the entire air passage d.e." It would be impossible to convey any such substance as concrete in such an apparatus, and even if it could be, the mixture would be destroyed. No suggestion of such a thing is found in this old foreign patent. Furthermore, the outlet jet, so vital to the McMichael invention, or its equivalent, *is entirely lacking.* The fact that the District Court and the Court of Appeals in the *Storrie* case regarded this flotation jet-lacking device of the old German Kolsche patent as an anticipation, *is evidence of their misconception of the true character of the present invention.*

The Duckham British patents No. 4,400 of 1875 and No. 15,348 of 1885 (*Storrie* case, Exhibit Book, pp. 598 and 606) are for *liquid column* apparatus. They relate to dredges and dredging in which mud and other substances dredged are floated in a column of water through a conduit merely by pressure behind the liquid column. This is an old scheme, and although it was used for at least thirty years prior to McMichael's application, no one—barring Smith in 1872—ever proposed to use it for concrete or the like; **and no one having any knowledge of the character and requirements of concrete would propose such a thing.** To use it would be to destroy the concrete mixture absolutely in order to convey it.

Nor do the Duckham patents show or describe such a thing as a nozzle at the outlet. The mere suggestion

that nozzles at the bottom of a huge tank of liquid pointed towards its outlet *may be used* for stirring up the mud, etc., means nothing. It would mean nothing even if these were United States patents and not foreign patents, and even if the apparatus were a compressed air apparatus for conveying concrete. The **location** of McMichael's jet or nozzle *near the opening into the conduit*, is absolutely essential, and without it his invention is not present. **It was the conception of the importance of this nozzle and its particular location that made the McMichael invention and its wonderful work possible.**

Here again, in citing the Duckham patents as anticipations, the Court in the *Storrie* case shows an entire misconception of the character of the present invention.

Collectively these prior patents fail to teach the vital and essential features of the McMichael invention, viz.:

A mass of concrete with pressure behind it, pressing it into a restricted outlet, and a velocity jet injecting air into the compacted mass in the outlet to drive it through the conveying conduit.

There is not in any of them any showing of any arrangement or method for handling concrete—or any other material—by forcing a mass of it into a narrow outlet of a chamber, and there shooting into the mass a jet of air, the forcing pressure and the jet pressure co-acting simultaneously on the mass in the vessel and its outlet.

VI.

INFRINGEMENT.

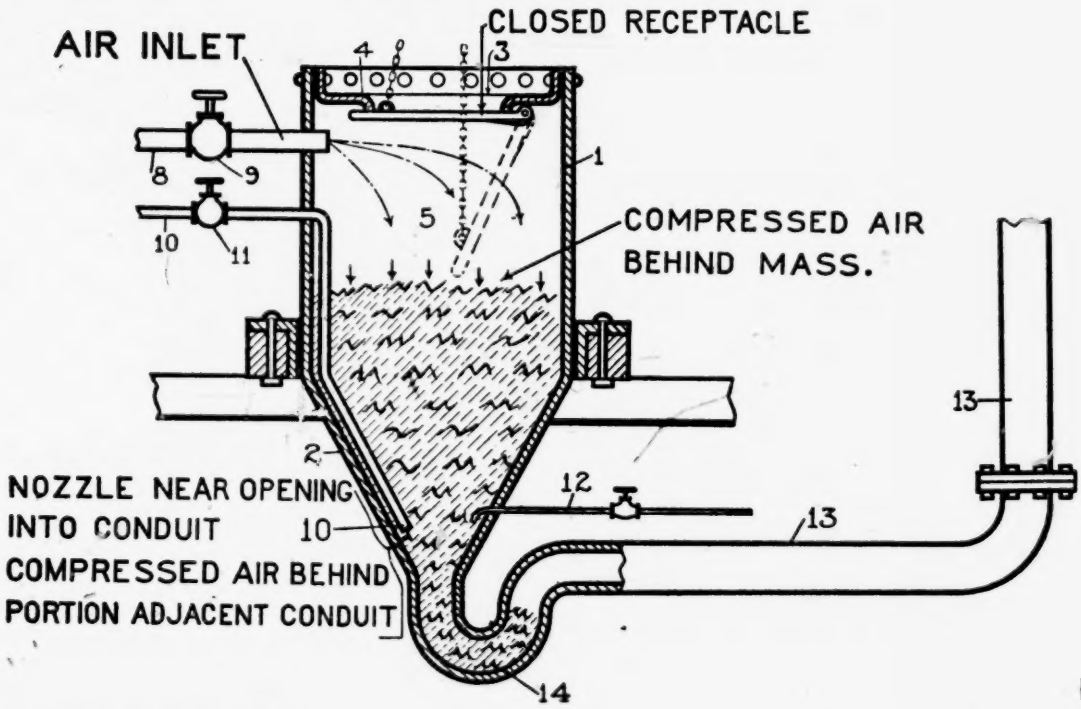
The full embodiment of the patented invention in the petitioners-defendants' apparatus is so clear that there is hardly room for serious argument.

The petitioners have used the apparatus of the patent and have practiced the method described and claimed therein. Their copying of respondent's commercial apparatus has been full and complete. Petitioners' subtle praise of the invention is emphatic.

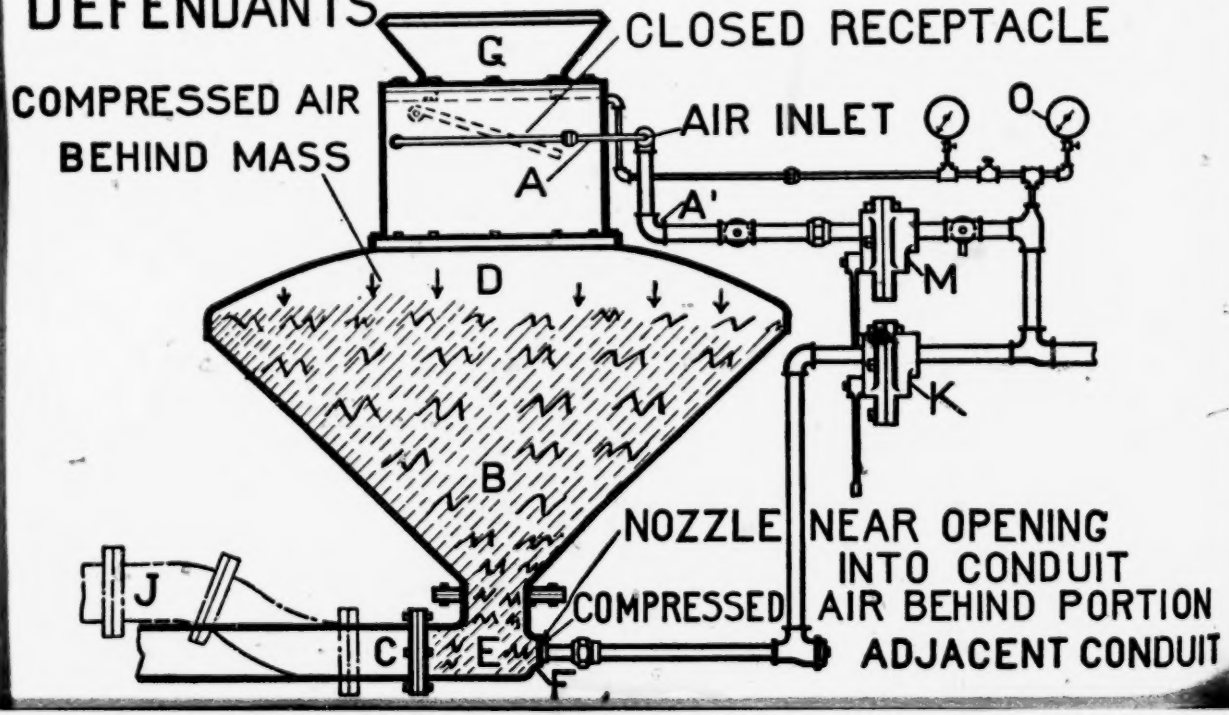
In fact the defendants' apparatus here is *a substantial reproduction* of the apparatus of the patent in suit, No. 1,127,660, which differs from the illustrated embodiment of the patent in unessential details and proportions only. It is constructed on the same plan and operates in exactly the same manner to produce exactly the same result.

For the convenience of the Court we here reproduce in their essentials the apparatus of the patent in suit (R. 384) and the petitioners' apparatus as shown in Exhibits 3, 4 and 5 (R. 292-4), so that their full correspondence can be quickly seen. The cut is from Exhibit 4.

PATENT IN SUIT



DEFENDANTS



The defendants' apparatus is also illustrated in the photograph of it (Exhibit 3, R. 292), made while it was in actual use, reproduced in Engineering News-Record and identified by the petitioners at the trial and in answer to interrogatories (R. 20), and in the second drawing, Exhibit 5 (R. 294).

Exhibit 4 shown in the foregoing cut of defendants' (petitioners') apparatus was also (reluctantly) identified by the petitioner Fleck at the trial and the construction and operation explained (R. 22-27).

The same nine claims relied on in the *Ulen* case (2, 4, 6, 17, 21, 22, 28, 34 and 25) and there held to be valid and infringed, are relied on in this case, and were found to be infringed. Nine other and additionals claims (5, 8, 9, 12, 15, 19, 24, 31 and 32) were declared on in this case (R. 21 and 282), but in view of a question raised by the defendants as to whether the case was tried on these additional claims, a decree under them was voluntarily waived (R. 328) and a decree entered under the original claims only.

The petitioners' apparatus and the method practiced by them with it infringes *nearly all* the claims of the patent in suit; but the claims recited in the decree are sufficient.

Each and all of these nine claims are fully embodied.

The following claims are quoted, because they appear to be characteristic definitions of the process and apparatus of the patent, and also because they are obviously infringed by the petitioners' apparatus *from the beginning to the end* of its use by them.

> "4. The method of conducting concrete forming materials from a receptacle along a closed conduit

connected therewith to the place where it is to be utilized, which consists in closing the receptacle, introducing compressed air behind the mass of materials and also behind the portion thereof lying adjacent the conduit, and thereby pushing the mass into and along the conduit.

"6. The herein described method of treating and conveying a relatively compact and impervious mass of concrete forming materials which consists in positioning the mass in a chamber connected with an extended outlet passageway, applying air pressure behind the mass within the chamber to force it toward the outlet passageway, and injecting a jet of air under pressure into the mass at an angle to the line of movement of the mass into and through the said passageway.

"21. In a device for treating and moving a mass of concrete forming materials, the combination of a chamber adapted to receive and contain the said mass, a discharge duct connected with the chamber, the said chamber having walls which gradually converge on all sides to the duct, and join the duct walls with substantial smoothness, means for supplying a fluid pressure agent to the chamber back of a mass of materials contained therein, and means for directing a fluid pressure agent into the discharge duct in the general direction thereof.

"22. In a device for treating and moving a mass of ingredients for forming concrete and containing relatively large pieces of material, the combination of a relatively large discharge duct, a pressure chamber for receiving the said ingredients of the concrete mass, said chamber having walls which gradually converge to the discharge duct and join the duct walls with substantial smoothness, the parts being arranged to have pressure exerted upon the material within the discharge duct from the

surface of the mass in the chamber on lines extending directly into the discharge duct.

"28. In a device for treating and delivering a mass of materials for forming concrete, the combination of a chamber, a discharge duct communicating with the chamber, a pipe for delivering a jet of fluid pressure agent for propelling the said concrete materials, a manually controllable valve in the said pipe, the said pipe being arranged with its receiving end outside of the said receptacle and with its delivery end outside of the discharge duct but adapted to deliver the jet of fluid agent to the interior thereof, the interior of the said discharge duct being thus left substantially unobstructed."

The remaining claims (2, 17, 34 and 35) specify "a compressed air inlet pipe" for supplying compressed air "remote from the conduit" (Claim 2) or "means for supplying a fluid pressure agent to the chamber back of a mass of materials," in addition to the means for directing it "into the discharge duct" (Claims 34 and 35), or "near the opening into the conduit" (Claim 2), and as it is claimed by the petitioners that this top air inlet was disconnected at some time prior to the end of the infringing period—but long after the suit was instituted and after this case was on the Trial Calendar of the Court—these claims are not quoted here.

Even if petitioners' claim is correct, they infringed all the claims until shortly before the trial of the case, as they had this top air inlet all along—though they claim they did not use it part of that time—and infringed five of the nine claims for the entire period.

The Court of Appeals for the Second Circuit expressly held infringement of these five claims (4, 6, 21, 22 and 28) during the entire period (Opinion, R. 348).

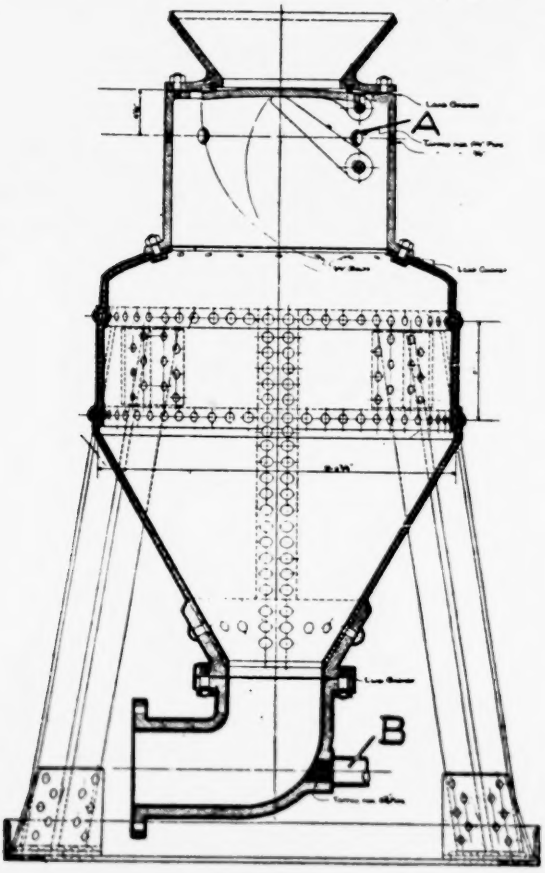
Comparing the claims with the petitioners' apparatus (see foregoing cut and Exhibits 3, 4 and 5, R. 292-4) we have the following:

> (Claim 4) "Closing the receptacle" (by top door between G and D), "introducing compressed air behind the mass of materials and also behind the portion thereof lying adjacent the conduit" (through pipe F or pipes A and F) "and thereby pushing the mass into and along the conduit" (C, J).
>
> (Claim 21) "A chamber adapted to receive and contain said mass" (D), "a discharge duct connected with the chamber" (C, E), "the said chamber having walls which gradually converge on all sides of the duct" (at B), "means for supplying a fluid pressure agent to the chamber back of a mass of materials contained therein, and means for directing a fluid pressure agent into the discharge duct in the general direction thereof" (at F or at both A and F).

The other claims above quoted are equally well embodied.

The petitioners' apparatus is a substantial copy of respondents' commercial apparatus. This is shown by the following cut made from the illustration of respondents' apparatus, which is Exhibit 5 in the Ulen suit, and is printed at page 184 of the record (Exhibit D) in that suit. It was identified by Mr. Kirkland, for the respondent, at page 43 of the Ulen Record.

Respondents Commercial Apparatus



As frequently happens, the respondents did not go to the patent to learn how to infringe, but simply imitated the apparatus made under the patent, and so successfully used in numerous great enterprises.

The commercial apparatus, as will be seen, is a full embodiment of the invention. The mass of materials is placed in the vessel, and compressed air is admitted to the top of the vessel to establish pressure behind the mass through the air inlets A, thus compacting the mass and forcing it into the lower end of the vessel and its outlet.

Compressed air is then turned on at the outlet nozzle B, so that a velocity jet is injected into the concrete packed in the outlet, to loosen it or break it and drive it in masses, by air pressure, through the conveying conduit. The compressed air from the nozzle B is directed into the outlet of the vessel, and behind the portion of the mass "lying adjacent to the conduit" (Claim 4). The opening into the conduit is immediately in front of the nozzle," and the nozzle is "directed towards said opening" (Claim 2). The jet from the nozzle is also injected "into the mass at an angle to the line of movement of the mass into and through said passageway" (Claim 6).

The fluid pressure from the jet is also directed "into the discharge duct in the general direction thereof" (Claim 21), and the other requirements of the claims are also fulfilled. *The vessel or chamber extends to the point E* where the vessel and the discharge conduit are joined in defendants' (petitioners') machine as illustrated, there being a separate elbow member at this point *which forms, in effect, a part of the vessel and a part of the discharge duct;* and the nozzle F is directed into this opening and into the discharge duct and the mass packed therein, to dislodge it and drive it through the conveying conduit.

The operation may, of course, be performed by turning on the air at the bottom first or turning on both simultaneously, or—less efficiently, perhaps—by turning on the bottom jet only and establishing the top pressure by the air shooting up through the mass in the closed chamber at the start of the operation.

The nozzle in both respondent's and petitioners' commercial apparatus is therefore not in the conveying conduit, but at the opening from the vessel into that conduit, where the mass of materials in the vessel is packed by the pressure behind the mass.

The complete embodiment is shown by the testimony of the petitioner Fleck, who was subpoenaed at the trial, and who (reluctantly) identifies the vessel in which the concrete was contained as D (Qs9-12, R. 23), the compressed air inlet pipe which was used to admit air to the upper part of the chamber and behind the mass of materials as A (*id.*, Qs14-18), the compressed air inlet pipe used to admit compressed air adjacent the conduit as F (*id.*, Qs34-36), and the door used to close the vessel as between G and D (*id.*, Qs42 and 43). He also identifies H and G as a hopper arrangement for admitting concrete into the vessel, M as the valve controlling the top air inlet, K as the valve controlling the lower air inlet, O as the pressure gauge on the air supply pipe and N as the air pipe by which the door is closed (*id.*), *and admits fully the operation of the apparatus in the manner described in the claims.*

Defendant Fleck also identifies the blue-prints of the drawings, Exhibits 4 and 5, which were produced by him under subpoena, as correct illustrations of defendants' machines (Q59, R. 27). They are the manufacturer's drawings, from which the machines were built.

That the apparatus is a full embodiment of the patented invention is also admitted by defendants' managing officer, Mr. Kennedy, in his final answers to plaintiff's interrogatories (R. 10-20). These interrogatories referred to descriptions and illustrations of the defendants' machine published in the Engineering News-Record and the Com-

pressed air Magazine in 1925, the year after this suit was commenced, and among other things show a cut of the pneumatic concrete placing machine (Exhibit 3, R. 292) and describe its general operation in the following language (R. 18):

> "Placing Concrete."
>
> . . . . . .
>
> "Essentially the gun, as shown by Fig. 12 [R. 292] is a conical drum with charging and discharge connections and with valves and air connections. When charged with concrete the proper *valves* are operated, air is turned on and the batch *is forced out of the drum* and driven through the discharge pipe line to the point of deposit. In the subway operations the air pressure has ranged from 65 to 80 lb. It has been possible to shoot a batch a minute. With the three outfits 160 cu. yd. of concrete have been placed in a shift. A 6-in. discharge pipe line has been used in all instances. The maximum delivery which the work will require is 1,500 ft. So far one of the larger guns has delivered through 1,160 ft. of pipe, with nine right-angle bends, to a height of 57 ft. above the drum. At the end there was a vertical lift of 24 ft. It will be noted that the gun is not depended on for any mixing action, it is simply a device for delivering concrete already mixed in the regulation manner."

And the interrogatories were (1) whether the article did not "*correctly describe and illustrate the work now being carried on* and carried on since the grant of the patent in suit and prior to the commencement of this suit by the defendants in the Southern District of New York as stated therein" and (2) whether the said article did not "*correctly describe and illustrate the work carried on by the defendants at the time and place stated* in the last question under the heading 'placing concrete'" (R.

10), thus directing attention to the particular subject of the machine and its operation.

The interrogatories were answered May 10th, 1926 (R. 20), and the answers, which were in *the affirmative*, therefore cover a period of nearly three and one-half years prior to that date (beginning December, 1922, R. 201), and up to the time the case was on the trial calendar of the Court. The Engineering News-Record article was published February 12, 1925 (R. 10), the year after this suit was commenced, and after the defendant had been using the infringing apparatus *for more than two years.*

These magazine articles were, of course, published largely on behalf of the defendants-appellants to advertise the character of the work being done by them and its excellence. Mr. Kennedy personally gave the writer of the magazine article all his materials (XQs120, 121, R. 217). The construction and operation described is therefore that which existed and was carried on *prior to February, 1925, and at least until the case was called for trial in May, 1926.*

A reading of the foregoing quotation from the magazine article with the cut (Exhibit 3, R. 202) before us will be sufficient to show that *the embodiment of the patented invention was complete in every respect.*

The concrete is dumped into the vessel D at G, the door between G and A closed, air admitted at A through the pipe A^1 controlled by valve M, and air admitted to the bottom outlet through pipe F controlled by valve K. The concrete is forced down through the contracted lower part D of the vessel to the outlet E and there cut off and driven to and through the conduit C, J, to the point of placement.

The operator at the right in the picture with his hands

on the controls is Mr. Kennedy's best operator, Swartz (R. 230).

The actual construction and operation of appellants' machine is fully described in the testimony of plaintiff-appellee's expert, Mr. Ray, a man of the highest scientific training and experience, and who is very familiar with apparatus of this particular character. He has also actually studied the defendants' apparatus and other similar apparatus *in operation* (R. 255). His testimony, however, need not be quoted at length here. After describing the construction and operation of the infringing apparatus, and two modes of operating it (*i. e.*, by turning on the top or the bottom air first), he concludes (R. 255-6):

> "If this mode of operation, either one of them which I have outlined, is carried on, then the apparatus, in my opinion, will operate exactly the same as the device of the McMichael patent in suit; * * * *the whole operation being due to the pressure of the air and in no way due to its velocity or kinetic effect.*"

He then describes the operation of defendants' apparatus without the top air inlet pipe and concludes (R. 257):

> "The operation without the top inlet to the top of the receiver, in my opinion, *is identically the same, for all practical purposes, as with it connected*, because the air admitted to the point E in this photograph immediately blows up through the concrete in the receiver and continues to do so until the resistance to the upward flow is equal to the resistance to flow out through the discharge pipe."

If now we compare the defendants' apparatus in this case with the defendants' apparatus in the *Ulen* case

(Exhibits 2 and C, Ulen R. 181 and 195), it will be seen that *the present apparatus is more clearly an embodiment of the patented invention than was the earlier infringing apparatus.* In the Ulen apparatus the vessel was disposed horizontally, not vertically as in the patent in suit and in the present apparatus, and the materials instead of gravitating to the discharge outlet were pushed by a plunger (H) to the outlet. The compressed air inlet pipe (A) at the outlet in that apparatus was disposed at a different angle to the line of discharge and was not directly pointed toward the outlet. The Court, however, in that case held the defendants' apparatus to be a full embodiment of the patent invention.

In the *Ulen* case the defendant contended that there was no infringement because of the structural differences in detail, *and raised the same contention here raised* by the present appellants, saying that there was "no suggestion of the cutting off of a segment of the mass of concrete as referred to in the opinion of the Trial Judge" and further contending that:

> "Apparently the operation is to create a great disturbance in the mass of concrete so as to be carried by the air in this segregated condition through the exit conduit."

The same defense of non-infringement is therefore urged here as in the *Ulen* case, but on a structure which is more clearly that of the patent in suit than the Ulen structure.

Disposing of this contention his Honor, Judge A. N. HAND—after referring to the new alleged prior use in the present case—said (Opinion, R. 327):

> "Aside from this new proof *the defendants rely on the old contention made in the earlier case that*

their device is purely kinetic. I do not regard it as theoretically probable that masses of concrete containing gravel stones of a diameter running to one and a half inches can be blown long distances by compressed air and I think the testimony of Mr. Ray that he could detect the passage of a series of slugs when he put his ear to the outlet pipe is the more probable testimony. Moreover, if air were floating the concrete it would be bound to pass through the pipe and *the pressure would be so rapidly reduced that the heavier portions would be left in the pipe.*"

The claim of petitioners that they did not use the top air inlet pipe after the first few months and disconnected it several months before the trial, more than three years later, is unsupported by satisfactory evidence.

The defendants' managing officer, Kennedy, and his brother-in-law and operating foreman, Swartz, are the only witnesses for defendants as to the alleged non-user of the top air pipe and the disconnecting of it finally, prior to the time of the trial of the suit.

The trial was postponed from June until October, 1926, on account of the granting of a motion by the defendants for leave to set up a new alleged prior use defense (R. 10), and, as we have seen, the machine *was in its original condition and was actually operated exactly as the patent specifies* as late as May 10th, 1926. This is admitted by the answer of the defendants to plaintiff's interrogatories *on that date* to the effect that its construction and operation were as described in the Engineering News-Record article of 1925, which shows the apparatus with top and bottom air inlets (Exhibit 3, R. 381), and states that:

"Essentially the gun, *as shown by Fig. 12* (Exhibit 3) is a conical drum with charging and discharging

> connections and with valves and air connections. When charged with concrete the proper *valves* are operated, air is turned on and the batch is *forced out of the drum* and driven through the discharge pipe line to the point of deposit" (R. 17).

It will be noted that this description says that the proper valves (not valve) are operated, and that the batch is *forced out* of the drum. The photograph, while it is not very clear on this point, shows the operator Swartz with *one hand* on the lever of the *bottom* air valve and *the other* on the *top* air valve to admit air to the top as well as the bottom. Mr. Swartz does not *think* that he had his hand on the top valve lever when the picture was taken (Qs87 and 88, R. 236), but it will be noted that the valve stem is immediately beneath his left hand, and that neither the hand nor the arm is resting against anything else. He posed for this picture not later than the fall of 1924, to show how the machine was operated (*id.*, Qs89-91), and after they had been using the machine for nearly two years. This is sufficient *to cast serious doubt, at least,* on the statements of these two very interested witnesses that they used the top air pipe for only three or four months.

Furthermore, the defendant Fleck, who installed and set up the apparatus, does not claim that the top air pipe was not in use right along (R. 23-26, Qs15-18, 29-41).

Again Mr. Kennedy says that the top air pipe was "full of concrete" (XQs192 and 195, R. 224), but Swartz testifies that this pipe with its valve, after it was disconnected, was left on and *used as a relief valve* (Qs15 and 16, R. 231, and RDQ97, R. 237). It also had the gauge (57) on it which indicated the pressure in the top of the tank behind the mass (R. 233). Therefore, *it was not plugged*

up, and Mr. Kennedy's statement that it was, appears to be merely a matter of expediency.

Another indication of the unreliable character of the testimony of defendants' managing officer Kennedy and foreman Swartz, is found in the testimony of these witnesses concerning the length of time that the defendants' machine was actually operated with the top air inlet in use. Both the magazine articles published on behalf of the defendants in 1925, more than two years after the infringement started, *show and describe this top air inlet in use*, Mr. Kennedy says that its presence "was a matter of neglect" (Q40, R. 206), after previously stating that he does not think it "stayed on there more than three months after we started" (Q34, R. 205), and then admitting that it was not taken off at least until the spring of 1926, or at some later time which he is unable to state (Qs42 and 83, R. 206, 212). He also says that they "cut it off" when they started to use liquid concrete (Qs32 and 33, R. 205), but this is shown to be untrue by his testimony that they never used anything but "liquid" concrete except for about "fifteen minutes" when they started at the end of 1922 (Q23, R. 203, and XQs126 and 132, R. 218-9).

He tries to attribute their trouble with the so-called dry concrete to the top air valve, but it is obvious that they wanted to use wet concrete—as all contractors do—and succeeded at the beginning in getting permission to "use a little more water" (XQ147, R. 220). The trouble at the start was evidently due to their admitted ignorance of the machine and its operation (Q10, R. 201), and the immediate shift to concrete with more water in it to the labor-saving effected by the elimination of tamping or ramming of the concrete. Mr. Kennedy says that the permission to use "wet" concrete was a verbal arrangement with the inspector (XQ149, R. 220), although they

were working under a written specification (Exhibit 19, R. 295) which called for "rammed" concrete, which, of course, means a "dry" consistency (*id.*, R. 296). He also pretends to forget all about the quantity of concrete placed in the tunnel and declines to say whether it was 3,000, 6,000 or 66,000 yards (R. 215-17), although their pay was measured by this yardage at as high as $19.00 per yard (Exhibit 19, R. 295).

Mr. Swartz is also indefinite about when they discontinued the use of the top air inlet, but, like Kennedy, admits that they did use it for some time (R. 230-1). He says it was a few days after he started to work, which was in April, 1923, after the machine had been in use for about four months. He also says that the top was actually disconnected "*I think* last April. April, 1926" (R. 232). But, like Kennedy, is not at all certain as to this.

Again Mr. Kennedy attributes the plugging up of the apparatus at the test made during the trial to the alleged failure of the operator to wash it out the night before (R. 224, 7-9). This, no doubt, was to forestall any inference that the plugging was due to an attempt to operate the apparatus abnormally and with material which was not concrete but mostly water. He even goes so far as to say that he would discharge any man who neglected to wash it out (R. 229). It is significant that although the apparatus was operated at the trial test by his best operator (Q227, R. 229) and was not washed out after that operation (Ray, Qs44-47, R. 267) nothing happened to that operator. Clearly, Mr. Kennedy's statement is a statement of something *entirely beyond his knowledge*, and shows his carelessness when testifying to facts which cannot be disproved. Nor was any operator or engineer who was on the job, except Swartz, his brother-in-law

(R. 237), called to corroborate him. And on this point Swartz was not asked to corroborate.

Another indication of defendants' eagerness to bring in conclusions not warranted by the facts is Mr. Kennedy's claim that kinetic action is shown by the fact that the discharge conduit pipes were worn evenly on all sides but soon wore out at the bends (R. 208 and 210). These pipes had been disconnected and reassembled, and inevitably turned around, several times (R. 215), and it is obvious that wearing out at the bends or elbows is caused by the slugs of concrete striking these bends in changing their course through the pipe.

The evidence of defendants' witnesses on these matters is therefore not frank, to say the least; and that the Court placed no dependence upon it is evident from the brief attention paid to it in the opinion.

But at some time between May, 1926, and the trial in October, 1926, the air connection to the top inlet pipe was removed, and at the trial, when the work was nearly finished and the arches—the important part of the tunnel —were all in (Swartz, XQ74, R. 235), the apparatus was operated under the direction of the Court (R. 209) and at the plaintiff's request, with the top air inlet pipe disconnected from the compressed air supply.

It must be assumed therefore that for more than three years and until one and a half years after the commencement of the suit, at least, the machine was complete in its embodiment of *all* the features of the patent in suit, *including the top air pipe,* and that there is no credible evidence that it was not *used exactly* as the patent in suit describes.

But whether the machine was ever practically used without the top inlet is immaterial, since it operated in the same manner and produced the same result and clearly embodied at least five of the nine process and apparatus claims of the patent without this top air pipe.

On this point his Honor, Judge A. N. HAND, in his opinion says (R. 327):

> "All of the claims were infringed until the Powers-Kennedy structure was impaired in the hope of avoiding infringement. After ceasing to introduce pressure behind the mass of concrete by means of closing the upper valve, it is true that some of the claims are not met, yet some of them are. There is undoubtedly a pressure behind the mass in defendants' machine far greater than ordinary air pressure and varying according to the freedom with which the air in the outlet tube is passing through it. As each slug was discharged, the pressure in the discharge pipe would lessen and the pressure behind the mass amounting to something like thirty pounds would force a further slug into the outlet. If this were not so, the high pressure through the discharge pipe would hold back the concrete."

It is also well settled that infringement is not avoided by making one element of a patented structure perform the functions of two if the same result is obtained.

Bundy Mfg. Co. v. *Detroit Co.* (C. C. A. 6th), 94 Fed. 524, 538;

(Citing *Winans* v. *Denmead*, 15 How. 330-342 and numerous other authorities);

Nathan v. *Howard* (*Id.*), 143 Fed. 889, 893;

Lawson Co. v. *G. G. Atlas Systems* (C. C. A. 2nd), 14 Fed. (2nd) 22, 23.

The testimony on the question whether the defendants' changed apparatus actually operated in the manner specified in the patent, can hardly be regarded as conflicting since **all the witnesses on both sides admit that there was substantial top air pressure.**

Thus, defendants' expert, Mr. Dyer, says (R. 245):

> "That *air pressure above the mass* necessarily is always lower than the pressure below, because in addition to the weight of the concrete opposing the air as it flows out, we have the resistance to the passage of the air by reason of the material itself. So that *the pressure above is always considerably less than the pressure below.*"

Plaintiff's expert Mr. Ray says that the operation without the top air inlet is

> "identically the same for all practical purposes, as with it connected, because the air admitted to the point E [outlet] in this photograph immediately blows up through the concrete in the receiver' * * * until the two pressures equalize (R. 257).

And again (*id.*):

> "But when a large—or a pressure of a few pounds builds up at the bottom due to the slugs sticking a little bit at some point, or due to numerous slugs building up on the way out, the additional pressure will cause the air to flow up to the top of the receiver, so that I think it can be safely said that the pressure at the top of the receiver *is substantially the same* as the pressure at the point of discharge E."

Even Mr. Kennedy admits that there is top air pressure behind the mass. He says (Q81, R. 212):

> "Well, there is always some that would come up through the mass of concrete that is in the blower. It works up from the bottom."

Mr. Ray states positively that when the air was turned on from the main line at 65 to 75 pounds this main line pressure dropped to 40 or 45 pounds (R. 256):

> "Immediately, when the throttle valve K was opened, the air in this line dropped to about 45 pounds or something like that, 40 or 45 pounds, in that neighborhood.
>
> "The gauge on the receiver, on the top of the receiver, indicated some pressure, that is the particular guage that was being used on the machine. It was impossible, however, to show what this pressure was, so a new gauge was brought up by Mr. Kirkland which was later attached to the machine at this point and this gauge would jump up to about 30 pounds immediately that the throttle valve K was opened."

In this he is fully corroborated by Mr. Kirkland, who witnessed the tests with defendants' apparatus (R. 276).

Even defendants' operating foreman Swartz admits that the pressure at the top of the tank and behind the mass jumped from zero to "about 30 pounds when the concrete was going out," while the gauge on the main air line registered from 45 down to 32 pounds (Qs48 to 51, R. 233). On cross examination he says (R. 235):

> "XQ61. And then as soon as the air was turned onto the machine, it shot up to about, you say, 30 pounds? A. 30 pounds."

When we consider that 30 pounds per square inch on the surface of a mass of concrete 60 inches in diameter (see Exhibit 5, R. 383) *will give a total pressure of approximately 85,000 pounds* (60 x 3.14 x 15 x 30 = 84,780), it will be seen that the pressure behind the mass in the defendants' apparatus at 30 pounds per square inch was enormous, and more than ample to compact the mass, force it in a solid body into the outlet and present it to the bottom jet in this condition to be cut off and shot through the conveying pipe in slugs or sub-masses exactly as the patent describes.

This is the meaning of the patent where it says (p. 2, lines 53, 70, 88, etc.):

> "the rapidly moving air from the pipe 10 acts upon said masses successively of the general mass, at points near those where they enter the delivery pipe"

and where, in such claims as Claim 17, it says:

> "means for causing a jet of air to impinge upon successive portions of the mass in the general direction of the discharge duct."

That the defendants' apparatus even when the top air pipe was disconnected operated as a pressure apparatus, compressing the mass and cutting off and conveying "successive sub-masses," and not as a kinetic device floating the materials while in suspension, is thus well established.

His Honor, Judge A. N. HAND, dismisses the petitioners' contentions on the prior kinetic patents in view of this with scant consideration. He says (R. 328):

> "As for the point raised that patents for kinetic devices are pertinent prior art, it is answered by the fact that neither the patent in suit nor the defendants' device are kinetic in operation."

This pressure, as distinguished from kinetic, operation of defendants' apparatus is not only established by the evidence, but is established beyond all question by the physics of the case.

The evidence on this point may be summed up as follows:

1. *The nature and weight of concrete is such that it could not be conveyed by the kinetic or floating action of air.*

Concrete weighs about 150 pounds per cubic foot or over 2 tons per cubic yard (Ray, Q96, R. 275), and consists of a mass of rock or coarse gravel, in this case only small enough to pass through a one and one-half inch ring (Kennedy, Q36, R. 205), with a smaller quantity of sand and cement. *The bulk of the concrete is rock.* When we consider that this rock has from 1600 to 2400 times the weight of air (Ray, Q99, R. 276), it will be apparent that to say tons of it are *floated* by air, distances up to 1160 feet—in this case—to elevations of 67 feet, and around numerous 90° bends (R. 203), *is to state a manifest absurdity.* It is no wonder that the Trial Court refused to believe it possible (Opinion, R. 327).

Mr. Dyer, defendants' expert, gives it as his opinion that the concrete is floated, but his opinion is not that of an engineer (Q58, R. 252) or of a man with actual experience in this art (*id.*), and he even entertains the notion that air is .1 or .01 of the weight of water instead of .0012 or about 1/800th the weight of water, which is the fact (R. 251). If air were really 80 or even eight times as heavy as it is, it would, of course, act in a different manner.

The Court of Appeals affirming the Trial Court on this point said (R. 346):

> "On the other hand, it is difficult to believe that particles of the mixture, including stones of an inch and half in diameter, are floated independently in the air, as sand or grain is blown. *Ray's testimony regarding the stones effectively disposes of that possibility under any such pressures as are used.* It would seem to us that the mass as a whole must block the passage of air, forming an obstruction which yields at different points, because of its uneven power of resistance, and that the heavier stones must be carried by the impact and momentum and cohesion of the lighter substances, the whole mass going forward in a constantly agitated mixed stream, just as McMichael describes."

They also find that regardless of the nature of the movement of the materials, the patent is infringed using the following language (R. 346-7):

> "Moreover, several of the claims in suit are for the apparatus, or machine, and if they are infringed it is enough for the purposes of this suit, whether the machine discharges its concrete kinetically or in successive slugs."
>
> . . . . . .
>
> "But whether the concrete goes forward as we imagine, or in some other manner, *there is no sufficient reason to suppose that defendants' machine does not operate in the same manner as plaintiff's, whatever that manner may be.*"

2. *If the concrete were conveyed in a floating condition by the air as defendants contend, the air would blow through it and the pressure would drop to almost nothing.*

The Trial Court noted this self-evident proposition saying (Opinion, R. 327):

> "Moreover, if air were floating the concrete it would be bound to pass through the pipe and the pressure would be so rapidly reduced that the heavier portions would be left in the pipe" (see also Ray, R. 261).

3. *If the concrete were floated it would first have to be broken up, and the careful intimate mixture required by the specifications of defendants' contract destroyed.*

This is also self-evident, and shows how impossible the thing is. Imagine the Board of Transportation carefully specifying a thorough and intimate mixture of the fine and coarse aggregates in a concrete mixer which must be rotated at least "one minute" to insure that mixture (R. 295-6) and then permitting the contractor to *blow it to pieces* and disintegrate it between the mixer and the subway walls. Of course, the inflation of the mixture by a blast of air would blow out the sand and cement and leave the rocks comparatively bare (R. 261-2).

4. *If the concrete were floated or carried in a blast of air at the rate of 100 feet per second, as both sides agree* (see Ray, R. 260), *the water and fine particles would be delivered in the form of a spray.*

In other words, the water and the powdered cement would be "*atomized*," and would escape in the atmosphere leaving the concrete mixture without these vital elements, so that we would have "concrete" without cement, and, therefore, *no concrete at all.*

But no such action, of course, takes place. Even Mr. Kennedy admits that the concrete came out "*solid.*" He calls it a liquid—which it was not—but nevertheless says that this liquid came out solid and that there were no air

bubbles in it. This is also the testimony of the other witnesses.

Mr. Kennedy says (R. 224) that when the concrete comes out of defendants' apparatus "*it is like wet concrete,* surely, stones, sand and cement" (XQ186), and

> "XQ187. It is quiet? A. Oh, yes, a liquid *mass.*
> "XQ188. Bubbles would make honeycomb, and we do not allow the air to get in the concrete where it is placed."

And, finally:

> "XQ189. When the concrete is *discharged* it is *solid?* A. It is.
> "XQ190. It is solid? A. Oh, yes, there is no question about it."

Realizing that he had unwittingly admitted that the conveyance and discharge of concrete was not—and could not be—due to kinetic or floating action, which would, of course, separate the aggregates and mix air with the whole mass, he, on recall after adjournment (R. 242-3), says that his foregoing answers are "ambiguous" and explains that:

> "A. The concrete as discharged from the pipe is in a *liquid* condition. When it goes into the form it is in a *liquid* condition. It solidifies in the form" (Q230).

Thus again admitting, while attempting to explain, that *it is not broken up or mixed with air.* Whether it be called a liquid, a solid or a semi-solid, the fact that it is not broken up or disintegrated shows that it is not conveyed kinetically but *in a mass.* Mr. Kennedy calls it "a liquid mass" with no air in it, and this seems to settle the point.

Of course, it is an exaggeration to call the wettest concrete "liquid," since the bulk of it is rock and the other aggregates are solids, except the very small quantity of water. If the mixture were really liquid it could not be placed in the side and overhead forms of the tunnel arch but *would run out.*

Nor do defendants' photographs (Exhibits L, M and N) show anything to support the flotation theory. They are flash-lights, with the camera shutter open (R. 248), of material moving at 100 feet per second and *show nothing of the material but a blur* (Ray, Qs29-30, R. 262).

Even the tests made by defendants during the trial prove that there was no kinetic or air floating action in defendants' machine, but positive pressure action conveying the material.

These tests were made at the direction of the Court at the Queensboro Subway in 41st Street, where the machines were located, the work of placing the concrete arches of the tunnel being completed (Swartz, XQ74, R. 235), and the machine tested being in use to fill in outside the water-proofed subway wall (Kennedy, Qs217-8, R. 227). The machine was operated by the defendants' chief operator Swartz and the operation was witnessed by counsel, by Messrs. Swartz and Kennedy and others for defendants, and by Mr. Ray, plaintiff's expert, Mr. Kirkland and Mr. Fitzgerald, a skilled operator, for the plaintiff.

The machine was down in the excavation, about 55 feet below the point of discharge at the street level, and the pipe from the machine up to the point of discharge had in it eight 90° bends and two 45° bends (Kennedy, XQs203-208, R. 226).

The "concrete" used was not a real concrete mixture at all (Ray, Q14, R. 259, XQ75, R. 270; Fitzgerald, Qs5-9, R. 280; Kirkland, R. 276).

The pressure employed on the test was very low, and the volume evidently inadequate, because the pressure dropped to 40 or 45 pounds in the main air line as soon as the air was turned on (Ray, R. 256, Swartz, Q50, R. 234). The top air pipe was disconnected.

Nevertheless the machine operated as a *pressure, mass discharging* device, and in the following manner:

A. As soon as the air pressure was turned on, the pressure in the top of the vessel and behind the mass immediately jumped from zero to about 30 pounds (Ray, R. 256 and 339, Swartz, Qs49, 60, 61, R. 234-5). This demonstrated that although the top air pipe was disconnected air pressure behind the mass was instantly established, the total pressure, on the top surface of the mass, at 30 pounds, being *as high as 42 tons.*

This pressure behind the mass is substantially the same as the bottom pressure. In other words, there is a balance between the pressure behind the mass and the pressure at the outlet (Ray, R. 257 and Q12, 259). As Judge HAND says in his opinion (R. 328):

> "If this were not so, the high pressure through the discharge pipe would hold back the concrete."

B. The mixture was packed and forced by this pressure through the contracted outlet where it was cut off and conveyed in *slugs* by air *pressure* at a rate approximating 100 feet per second through the conveying conduit with its ten elbows and to the point of discharge 55 feet above the apparatus (Ray, R. 256, Kirkland, R. 276).

This was carefully and thoroughly observed by Mr. Ray who says (R. 256):

> "I observed the operation in all ways that I could by listening to the concrete passing through the pipe, discharge pipe J, about 50 or 60 feet from the receiver, placing my ear to it and by observing it coming out of the pipe. I noted distinctly the passage of slugs through the discharge pipe J.
>
> "In one particular instance I had my ear against the pipe and the whole pipe made such a jump as the slug passed by, that it startled me and I jumped up. I heard smaller slugs distinctly going through."

In this he is fully corroborated by Mr. Kirkland (R. 276) and Mr. Fitzgerald (R. 280) and their testimony was accepted by the Court.

These practical tests and observations were accepted by the Trial Court as establishing the full realization of the invention and its operation as contended. Judge A. N. HAND in his opinion (R. 327) says:

> "I do not regard it as theoretically probable that masses of concrete containing gravel stones of a diameter running to one and a half inches can be blown long distances by compressed air, and I think the testimony of Mr. Ray that he could detect the passage of a series of slugs when he put his ear to the outlet pipe is the more probable testimony."

This amounts to a conclusive finding of fact on this point, although slug or sub-mass movement of the concrete is not essential to infringement.

C. There was no material separation of the stone, sand, cement and water, but this was delivered at the discharge end of the conduit *substantially intact* (Ray,

Qs25 and 27, R. 261, XQ72, R. 270 and Fitzgerald, Qs18 and 19, R. 280). This demonstrates that there was no kinetic action or carrying of the materials in an air current, but a conveyance of *the complete mixture in "submasses" without separation.* Further evidence of this is found in the fact that the slugs moved faster at the discharge end than near the other end, which shows that they accumulated velocity (Ray, Q19, R. 260) due to the maintenance of the air pressure held behind them (*id.* Q23).

When the defendants first attempted to discharge materials in the apparatus it failed, and the pipe plugged up, and an hour or more was required to clear it and put it in operating condition again (Ray, Q26, R. 261, Kennedy, XQs181-3, R. 224). The cause of this does not appear, nor how the apparatus was operated to produce it. It appeared at the outlet that this was an attempt merely to clean out the machine (Ray, Q26 and XQ69, R. 261 and 270).

The defendants' machine therefore with the top air pipe disconnected, with inadequate pressure and a mixture which was not really concrete operated in the manner specified in the patent and realized the invention.

This was not disputed by defendants' witnesses, except Mr. Kennedy, who nevertheless admitted that the concrete came out *as mixed concrete without air separating it,* and Mr. Johnson, defendants' counsel who took the stand in an attempt to dispute the testimony of plaintiff's witnesses and testified that the materials came out separated (R. 277).

Mr. Johnson's observations, however, were evidently faulty, for he says that the time required for the discharge of an entire batch of concrete was "a few seconds" (XQs3, 6 and 7). Then "from 5 to 20 seconds or maybe 25 sec-

onds" (Q10). It actually took more than a minute (Fitzgerald, Q10, R. 280), and this was the time it took for the discharge of a batch when Mr. Dyer witnessed it as defendants' expert (R. 246).

Mr. Johnson's bias is shown by his telling Mr. Fitzgerald, whom he evidently took to be one of the defendants' workmen, to "keep quiet" when the latter said that the mixture was "very unusual" (R. 280).

The testimony of Mr. Fitzgerald, who is a skilled and experienced operator of apparatus of this kind with a thorough knowledge of concrete, corroborating Mr. Ray and Mr. Kirkland, was therefore substantially undisputed. He says (R. 280):

> "Q18. Mr. Fitzgerald, how did the concrete come out of that machine on October 7th, at the discharge pipe? A. It came out in sections. I would say, first came in sections of concrete, then air, and then sections of concrete.
>
> "Q19. Was the concrete separated? A. No, sir."

And his testimony as a practical expert that the mixture used was not a proper concrete mixture (Qs5-9), which is not disputed, but is corroborated by Ray and Kirkland, shows how unreliable the defendants' testimony is, and indicates why no weight was attached to it—such as it was—by the Court.

The finding of the Court, after hearing the witnesses and judging the weight and credibility of their testimony, that defendants' device operated in the manner set forth in the patent (Op. R. 327), *is conclusive.*

> *Adams* v. *Gilliland*, 242 U. S. 350;
> *Blettner* v. *Gill*, 251 Fed. 81.

An infringer cannot escape liability by impairing the apparatus or processes covered by the patent.

This doctrine is so well settled that it hardly needs quotation from any authority to support it. Perhaps the best known cases are the following:

Sewing Mach. Co. v. *Frame*, 24 Fed. 596;
Penfield v. *Chambers* (C. C. A. 6th), 92 Fed. 630, 653;
King Ax Co. v. *Hubbard* (C. C. A. 6th), 97 Fed. 795, 803;
Nathan, et al. v. *Howard*, 143 Fed. 889, 893;
National Binding Mach. Co. v. *McLaurin* (S. D. N. Y.), 186 Fed. 992, 996;
Manton Gaulin Co. v. *Dairy Co.* (D. Con.), 238 Fed. 210, 215; affirmed (C. C. A. 2nd) 247 Fed. 317.

In *King* v. *Hubbard* (*supra*), Judge TAFT, writing the opinion of the Court, said:

> "This is an instance, not infrequent in patent litigation, where the infringer has sought to evade the claims of a patent, the substance of which he is appropriating, by deliberately impairing the function of one element, without destroying the substantial identity of structure, operation and result" (citing authorities).

The doctrine was directly endorsed by the Appellate Court in *Elyria Iron and Steel Co.* v. *Mohegan Tube Co.*, 7 Fed. (2nd), 827, 831, though the Court was divided on the actual facts. In that case his Honor, Judge HOUGH, said:

> "* * * and impairing or badly applying a method will not avoid infringement of a patent therefor."

Following these authorities his Honor, Judge A. N. HAND, in the present case (R. 327) said:

> "All of the claims were infringed until the Powers-Kennedy structure was *impaired in the hope of avoiding infringement.* After ceasing to introduce pressure behind the mass of concrete by means of closing the upper valve, it is true that some of the claims are not met, yet some of them are."

And the Court of Appeals affirms this finding in the following language (R. 348):

> "Mr. Ray, plaintiff's expert, testified that, because of this, the operation without the top air inlet is identically the same for all practical purposes as with the top inlet. While the claims which specify an upper air inlet (*e. g.*, claims 2, 17, 34 and 35) might not be infringed by a machine which omits it, the other claims in suit make no reference to the upper air inlet. We think there is clearly infringement of claims 4, 6, 21, 22 and 28."

The claims possibly not met are presumably the four structural claims (2, 17, 34 and 35) which expressly include an air inlet pipe or the like at the top of the vessel. The remaining five claims do not specify such an inlet but leave it to the operator working under the disclosure of the patent to provide pressure behind the mass to compact it and force it down into the outlet *in any suitable manner. Nevertheless, even these four specific claims for the structure were infringed until the top air pipe was actually disconnected shortly before the trial.*

But the question whether all the claims are met by this impaired apparatus instead of five of the nine in suit *is academic* and was evidently so considered by the Trial Court and the Court of Appeals.

The teachings of the patent specification leave one employing the invention such latitude as the defendant has exercised in practicing the invention. It says (p. 2, line 80, *et seq.*):

> "One of the strongly marked and novel matters incident to this provision of the pipe 10 for introducing air directly into the discharge pipe, whether considered *by itself* or considered as *supplemental* to the agency *such as* the air from pipe 8 tending to effect downward and forward propulsion of the entire mass, is this, that the rapidly moving air from pipe 10 acts upon sub-masses, successively of the general mass, at points near those where they enter the delivery pipe."

Again it states (p. 1, line 55):

> "The air inlet into the chamber being *preferably* near the top thereof."

Again (p. 1, line 86, *et seq.*):

> "The instant the air is turned into the chamber the door for the closure will be firmly held in closed position by the air pressure."

And again (p. 2, line 68, *et seq.*):

> "Air from the lower pipe 10 may force itself into the body of the mass, and the relatively small air jet acting upon the relatively large stream of outward moving materials directly engages with the sub-masses to push them along."

The defendants, therefore, did not have to go outside the specification of the patent to learn that they could utilize the lower jet to supply air pressure behind the mass as well as at the outlet, and thus perform the functions of the patented invention and embody its claims.

THE SLUG THEORY.

The Courts in the Second Circuit have held that regardless of how the concrete is discharged and conveyed, the petitioner has infringed by using the patented apparatus and method, and producing the same result.

They have also held that the patent is not limited to the slug theory of operation, saying (Opinion App't Court, R. 346):

> "To us the dispute seems irrelevant. The patent says nothing which commits the patentee to the slug method of operation."

Nor has the respondent ever contended that the slug method of operation was essential to infringement. Obviously it is not. Nevertheless, it is believed that by this method, substantially, and by it only, can the patented apparatus operate to produce its truly remarkable results. We, therefore, will outline the slug theory, as follows:

1. When the heavy, rocky, non-fluent mass of concrete is placed under pressure behind it in the chamber, it is compacted and jammed into the restricted outlet of the chamber.

2. It might be forced by this top pressure alone a short distance, through a discharge pipe, but even then it would be likely to form an "arch" in the restricted outlet, because the stones which constitute the major part of the mixture are substantially in contact with each other—the sand and cement filling the spaces between them—and will brace against one another to form an arch or dam as they are crowded into this neck.

It is for this reason that the bottom jet is sometimes referred to as the "*arch breaking nozzle.*" The nozzle, however, does not really *break* the arch in its normal operation, but *prevents the formation* of it, and insures a continuous outflow of the concrete by injecting a velocity jet into the material at this point.

3. But concrete certainly cannot be discharged and transported to any considerable distance—as all tunnel lining operations require—by pressure behind the mass alone. For short distances—up to say 30 feet—ordinary chutes, or buckets running on a boom, can be used, without the necessity of bringing in air pressure apparatus. Nor can concrete be forced around bends in the pipe, and up to such elevations as are commonly met with, by pressure behind it alone.

4. A half yard of concrete weighs a ton, and the resistance due to the friction between it and the pipe probably necessitates a much greater additional force than that required to overcome its weight.

5. Therefore, it is obvious that ordinary air pressure (the petitioners used as low as thirty pounds) cannot move a half yard column of concrete, nor even a quarter yard. The pressure required would amount to *tons*, and a half yard of concrete will fill an eight-inch pipe for approximately forty feet. *The resistance, therefore, is enormous.*

6. Something, therefore, must be done *to break up this column* and reduce it to sections. But the concrete cannot be floated; that is physically impossible. Moreover, a jet of air from a two-inch pipe at as much as one hundred pounds pressure, expanding into an eight-inch pipe, would be reduced to almost nothing—possibly seven

pounds. Therefore, the pressure must be held or "pocketed."

7. It, therefore, seems obvious that the only way to break up the heavy column and preserve the pressure behind it, is to separate that column into slugs or small plugs. Now, in accomplishing this the patented apparatus operates in the following manner:

> a. The jet of compressed air from the nozzle penetrates the small portion of the mass packed in the outlet by the top pressure, and *cuts it off*, shooting it through the outlet and along the conveying conduit, as a ball of putty or other slug is shot through a blow-pipe.
>
> b. As soon as this slug moves the air issuing from the nozzle *expands* and the pressure there *is momentarily reduced.*
>
> c. This instantly causes another section of the mass to jam into the outlet, under the pressure behind it, which is constant or "static."
>
> d. This section or plug partly blocks the nozzle and causes a rise in the nozzle pressure, so that the nozzle cuts it off and shoots it forward again.
>
> e. This operation of alternately cutting off and shooting a slug, and pressing another into the outlet is repeated and goes on—with lightning rapidity—until the entire mass in the chamber is discharged.

This is the only way in which the wonderful result of the patented method can be scientifically accounted for; and Mr. Ray, whose scientific qualifications and experience are of the very highest, as the respondents' expert has very clearly shown that such is the case (Q6, R. 255-8; Ulen R. 126-131), *after a careful study of the apparatus*

in operation. And in this he is fully corroborated by the other witnesses (Kirk, Ulen R. 54; Bateman, *id.* 119; Fitzgerald, R. 280).

The evidence of this action may be briefly summarized as follows:

1. The gauge on the compressed air pipe leading to the nozzle vibrates, showing rapid pulsations in the pressure at the nozzle;

2. The slugs can be heard and felt at a bend of the conveying conduit not far from the vessel;

3. Close observation at the discharge mouth of the conveying conduit shows pulsations of the material, indicating that it is not being discharged in a solid stream, but in sections succeeding one another with such rapidity that they are hardly visible to the naked eye;

4. The discharge of the slugs is accompanied by rapid booming sounds, indicating the rapid escape of air pockets.

As the concrete is discharged at approximately a speed of 100 feet per second, even a camera with a shutter set at one one-hundredth of a second will show a blur. *The petitioners' flash-light photograph (Exhibit N), taken with an open camera shutter, therefore means nothing.*

When we consider that if the slugs are an average of one foot in length, they are discharged at a rate of more than *ten per second,* it is no wonder that the eye of the camera and the eye of the untrained observer records a continuous stream of material mixed with air, as Judge BOURQUIN believed. **But, as we have seen, whether this theory is correct or not, the petitioners have used the patented apparatus according to the patented method, and have, therefore, infringed the patent.**

THE TESTS IN THE STORRIE CASE.

These tests, although they led to the finding of the Court that there was no slug action, are not such a basis for a finding as makes it conclusive. The conclusion is based largely on certain recording instruments employed by the experts for the two parties to that suit, plaintiff's being pressure and mechanical, and defendant's electrical. It is submitted that the electrical device used by the defendants in the *Storrie* case is not a proper recording instrument. It merely recorded the variations in *conductivity* in the conveying conduit, while the concrete was passing through it, and these variations in conductivity depend primarily upon the variations in the wet portion of the mixture—sometimes called "soup"—more than on the presence or absence of slugs. If the records are properly interpreted, however, they do indicate the passage of slugs. *It is submitted that the passage of slugs can only be properly recorded by instruments for recording pressure and vibrations, such as were employed by the plaintiff.*

The finding of the lower Court in the *Storrie* case therefore that there was no slug action is not a conclusive finding of fact.

VII.

THE CONFLICTING DECISIONS.

The decisions in the Second Circuit are correct on the facts and the law and should be affirmed. The decision in the Ninth Circuit is based on an erroneous conception and interpretation of the patent and the prior art relating thereto. It also accepts as evidence of prior art, matters which are not evidence at all. It should therefore be reversed.

The decisions in the Second Circuit have been discussed fully in the foregoing portions of this brief. The decision in the Ninth Circuit in the *Storrie* case (No. 528 here), will be fully discussed in the petitioners' brief in that case, and such discussion, therefore, need not be repeated. The following brief summary will be sufficient for the purposes of this case:

1. Of the prior patents which were held to anticipate the McMichael patent in suit, the Kolsche German patent, 18,394 of 1882, is *distinctly for a flotation or kinetic apparatus,* and the two British patents to Duckham No. 4,400 of 1875 and No. 15,348 of 1885, are for *liquid column* propulsion.

As we have seen, under the "Prior Art" section of this brief, the Kolsche patent is for an apparatus intended solely to convey granular material, such as sand, by dropping it in a *small stream into a current of air,* disintegrating it and floating it along. It was not intended to be used and *could not be used* for the conveyance of concrete or any similar substance. If, by the use of any amount of pressure, concrete could be conveyed in it, the concrete *mixture* would be *destroyed* by complete *separation* of the light and heavy elements or aggregates.

This patent was pleaded by the petitioners in this case and by the defendants in the *Ulen* case, but was not considered of sufficient importance to be used in evidence.

2. The two Duckham British patents are for apparatus designed to be employed in dredging operations and to convey mud and other excavated material *in a column of water*, by placing pressure behind the column. The nozzles or jets referred to—but not shown or described—were merely "to keep the mud agitated" in the bottom of a huge tank of water, and could have none of the functions of the McMichael specifically located *jet at the outlet of the chamber*. Nor did they suggest any such a jet or any such a combination of pressure as that which is *indispensable* to the McMichael invention.

3. *All three of these patents lack the vital and essential nozzle at the outlet of the chamber* for injecting compressed air into the mass, and lack the essential *combination* of *pressure* behind the mass and at the front of the mass.

It must, therefore, be apparent that the District Court for the Western District of Washington, and the Circuit Court of Appeals for the Ninth Circuit, *failed to appreciate the true character of the McMichael invention*, because they assumed that it was in the same class as these prior irrelevant devices. The *difference* between McMichael and these prior patents is *the very essence* of the present invention, and in failing to realize this, the Courts in the Ninth Circuit failed to *understand* that invention. In other words, *they ignored the features of the present invention, without which it would not exist.* This is true of the particular *location* of McMichael's jet at the outlet. Unless he had understood the vital importance of that particular location—which Duckham never dreamed of—he never could have made the invention.

4. The acceptance of Leake's vague and uncertain deposition, without corroboration or any visible, tangible evidence whatsoever, as sufficient to establish a prior use, is against all the authorities, and is believed to be unique in the annals of patent litigation.

This is rendered more extraordinary by the fact that Leake, whose patent application was filed nearly nine months *after* McMichael's, permitted McMichael to receive the decision of priority over him in the Patent Office.

The fact that Leake's application was purchased by McMichael's attorney for a small consideration in December, 1910, and in 1917 assigned to the owner of the McMichael patent, proves nothing, particularly in view of the fact that the Leake patent purports to be *for improvements only* on the specific form of the McMichael apparatus, which McMichael's attorney, and later the owner of his patent, may have considered of some value, *in spite of the fact that McMichael was the prior inventor* and had obtained claims for the *broad* invention—*which Leake could not claim.*

The fact that McMichael's attorney owned the Leake application, if it means that McMichael or his assignees controlled that application, *does not even suggest that they regarded Leake as the prior inventor.* Rather it indicates that, controlling both applications, and being in a position to issue the broad patent on *either* application to themselves, they chose to issue the broad patent on the McMichael application *because McMichael was the prior inventor.*

Furthermore Leake, in his deposition, expressly admits that prior to McMichael's application *he did not use* the vital and essential jet at the outlet, or any equivalent thereof. The acceptance of *ex parte*, unverified, hearsay

statements by Leake's attorney as evidence that he did, does violence "to every Anglo-American legal concept" of evidence.

General Electric Co. v. *P. R. Mallory Co.* (C. C. A. 2nd), 298 Fed. 579, 585;

Spaldings v. *Wanamaker*, 256 Fed. 530, 167 C. C. A. 602.

McMichael is dead (Ulen R. Q96, p. 56), and these transactions to which he was a party in the Patent Office date back twenty-two years. To bring up now *ex parte, hearsay* statements of others made during the few years following his application, and use them against him, is not only against all precedent, but against all fairness and reason. (See *G. E. Co.* v. *Mallory.*)

5. Both the District Court and the Court of Appeals have criticized the enlargement of McMichael's specification, and the addition of new claims during the pendency of his application. *This he had full right to do.* He even had the right to adopt claims to the invention which originated in Leake's application, *and which were suggested to him by the Patent Office* for interference purposes (File W. R. Ulen R. 212). This is common practice in the Patent Office in interference proceedings. It was purely a matter *between McMichael and Leake* at most, and one which these infringers, who have appropriated the invention as patented, cannot take advantage of.

6. The courts in the Ninth Circuit appear to ignore entirely the fact that McMichael in 1912 filed a supplemental oath covering all the alleged new matter in his application (Ulen R. 241, 251-253).

But, as we have seen, amendments to an application

which are fairly within the original disclosure require no supplemental oath.

> *Westinghouse Co.* v. *Metropolitan Co.* (C. C. A. 2nd), 290 Fed. 661.

And an applicant has full right to better describe and claim his invention if during the pendency of the application he obtains a fuller or better understanding of it.

> *Cleveland Foundry Co.* v. *Detroit Co.*, C. C. A. 6, 131 Fed. 853, 857;
> *Diamond Rubber Co.* v. *Consolidated Tire Co.*, 220 U. S. 428, 435.

7. The courts in the Ninth Circuit apparently held non-infringement—at least partly—because the slug theory was considered untenable, and because they seemed to consider it a feature of the patent (Opinion, 27 Fed. [2nd] 838). As we have seen, the patent is committed in no way "to the slug method of operation," and the Court of Appeals in this case has so decided. The patent itself is conclusive evidence of this. Whether the theory is correct or not, as the Second Circuit Court of Appeals has said, is "*irrelevant.*"

8. The courts in the Ninth Circuit also erred in considering the test made *in camera* by the defendants of the alleged Smith 1872 apparatus, of importance, for the following reasons, among others:

a. The test was made without the presence of anyone representing the plaintiff.

b. It was made by interested witnesses who represented an infringer of the McMichael patent (*Concrete* v. *Storrie*, R. 469-71).

c. No definite identification of the materials used is given except that "the Smith formula mix

was used" (*Id.* 465), and this means a "*liquid*" or freely flowing fluid—*which is not concrete.*

d. The liquid material was blown a very short distance only, and not enough to duplicate ordinary working conditions in any sense.

e. The witnesses do not state directly that the operation was *successful* or that it demonstrated *the practical character* of the Smith apparatus but that it was sufficient to "*satisfy*" them (*Id.*). Interested and biased witnesses are too easily "satisfied" as to the operativeness of a device alleged to anticipate a patent *which they have infringed.*

But the Smith 1872 patent lacks the indispensable nozzle near the outlet of the McMichael patent, and whether it can be made to deliver a soup called "concrete" for a short distance under skilful handling or not is immaterial.

That the defendants in both cases chose to use the nozzle—and all the other features of the patent in suit—and infringe, rather than resort to such a thing as that shown in the Smith patent, is sufficient evidence that the differences constitute the difference between failure and success.

9. Nor does the case of *Concrete* v. *Gomery* (269 U. S. 177), in which the patent disclosed no new element, combination or result, apply to this case, as the Courts in the Ninth Circuit held. The best answer to this is found in the able and learned opinion of Judge SWAN for the Second Circuit Court of Appeals in this case (27 Fed. [2nd] 688, R. 343), to which the Court is referred.

Kirkland's Engineers Society Paper.

The theory of operation stated by Mr. Kirkland in his Engineers Society paper, written more than six years before this suit was commenced, and which was fully corrected by him in the *Ulen* suit long before the defendants (petitioners) called him as *their* witness in this case, *is not evidence of anything, except the obscure nature of the principle discovered by McMichael, and is entirely inadmissible.*

The following Court of Appeals cases, hereinbefore referred to, are cited as showing the exclusion by this Court of documents which gave far better excuse for their introduction by the defendant.

> *Spaulding* v. *Wanamaker*, 256 Fed. 530, 533;
> *General Electric Co.* v. *Mallory*, 298 Fed. 579, 586.

Furthermore it was expressly corrected and explained under oath by Mr. Kirkland in this suit and in the *Ulen* suit, *after he had actually made tests* and found that his theory of operation was *incorrect*. It is also shown to be clearly erroneous by thorough tests with appellants' and appellee's and other apparatus and the testimony of witnesses concerning the same. Apparently the appellants' contention is that a theoretical, unauthorized and unsworn statement by Mr. Kirkland must be correct because he afterwards and now, after thorough test and scientific investigation, *swears* that it is *incorrect*.

The assertion that this is "testimony" is based solely on this paper describing Mr. Kirkland's *theory* of operation which was read before a meeting of engineers, more than *six years* prior to the commencement of this suit, and while he was connected with another concern than the plaintiff—the *Placing* company—which was a mere licensee, and while he did not represent the plaintiff or the patent owners directly or indirectly in any way (R.

104). Furthermore, Mr. Kirkland was *not* plaintiff's witness but *defendants'*, and while on the stand as defendants' witness *repudiated* any statement or inference in his article tending to controvert the statements of the patent or the testimony of respondents' witnesses that the apparatus of the patent is a *pressure apparatus* and *not* a kinetic apparatus (R. 105-6). His testimony in the *Ulen* suit a year and a half before he was called by the defendants in this suit was very fully and clearly to the effect that it is a *pressure* and *not* a kinetic apparatus (Ulen R. 47-49).

Nor did Mr. Kirkland in this article state that the patented apparatus was ever used—kinetically or otherwise—to place *dry* materials, as petitioners' brief implies, although it would be entirely immaterial. He said that it was used to place *and pack* limestone screenings and sand—which obviously must have been *wet*—in back of a concrete tunnel lining. That the stuff was *dry* or was *floated* is neither expressed nor implied.

But the entire article is worthless as evidence, and would be worthless if it had not been corrected by the witness.

It was ignored by both the Trial Court and the Court of Appeals—for the obvious reason that it was not evidence, and would have been worthless if admissible as such.

Theories of operation stated by a witness prior to his testimony in the suit *are not evidence at all.*

> *Marconi* v. *DeForest* (C. C. A. 2nd), 243 Fed. 560, 562.

The only value such a thing could have would be to show that McMichael's discovery was so obscured that an engineer who had seen his apparatus working was unable to solve its method of operation.

The Decisions in the *Concrete Appliances* v. *Gomery* Cases Clearly Support the Decision of the Courts in the Second Circuit in This Case.

In the decision of the Court of Appeals for the 6th Circuit, the patent was held valid because the prior devices *were not intended to handle concrete and were not useable for that purpose.*

Thus the Court, referring to the closest prior device says:

> "It would be practically useless for the purposes now involved."
>
> *Concrete Appliances* v. *Meinken*, 262 Fed. 958, 963.

And again

> "The question presented by Theiss seems not to be one merely of double use, because the structural differences are too great; but, if the physical resemblance were much closer, the defense of double use would be far from satisfactory. See Ansonia Co. *v.* Electrical Co., 144 U. S. 11, 18, 12 Sup. Ct. 601, 36 L. Ed. 327; Potts *v.* Creager, 155 U. S. 597, 606-608, 15 Sup. Ct. 194, 39 L. Ed. 275; Hobbs *v.* Beach, 180 U. S. 383, 390, 21 Sup. Ct. 409, 45 L. Ed. 586; Geld *v.* Newton (C. C. A. 2), 254 Fed. 824, 827, 166 C. C. A. 270. Certainly the art of loading coal into a ship for fuel is not the same art as that of distributing wet concrete to a building structure; nor is the analogy very close" (p. 964).

In the later decision of the Court of Appeals for the 3rd Circuit, the patent was held invalid *because the defendant in that case proved the use for concrete and similar materials of apparatus very similar to that of the patent.*

Thus the Court, after discussing the principal prior use *for concrete* and pointing out its similarity to that of the patent, said:

> "There is proof of the use at San Francisco Harbor in 1904-1906 of substantially similar *concrete chuting apparatus* placed on a scow. It clearly shows the use of chutes moved to different positions by a boom."
>
> *Concrete Appliances Co.* v. *Gomery*, 291 Fed. 486, 489.

And further, referring to the fact that the record in the 6th Circuit Court of Appeals did not show any prior *concrete* apparatus there in evidence said:

> "Had the actual state of the prior art been shown to the patent authorities, we cannot feel that they would have granted this patent, and while we feel embarrassed to find ourselves at variance with the Circuit Court of Appeals of the Sixth Circuit, which in the case of Concrete Appliances Co., *et al. v.* Meinken, *et al.*, 262 Fed. 958, found this patent valid, we feel assured that *the meager record* before that court wholly failed to disclose the now uncontradicted proofs on which we base our conclusions (*id.* p. 492)."

This Court held the patent invalid on the evidence before the Circuit Court of Appeals for the *Third* Circuit, saying:

> "Because of an evident *difference in the state of the proof* in the two cases, the adjudications of this patent by the two circuit courts are, we think, *only apparently conflicting.* It is clear from an examination of the two records, the earlier of which is an exhibit in this suit, as well as from the opinion of the court in the Sixth Circuit, that *that court did not have before it the detailed history of the practical development of the art*, which was elaborately proved in the present case and which convinced both the District Judge and the Circuit Court of

Appeals in the Third Circuit that the plaintiff's appliance did not embody an invention."

Concrete Appliances Co. v. *Gomery* (Nov. 16, 1925), 16 Sup. Ct. Rep. 42, 43; 17 L. Ed. (Adv. 40).

In the present cases the prior art disclosed is substantially the same in both records.

Neither record shows that any apparatus for transporting concrete or any similar material pneumatically was ever used. Neither record shows any apparatus for transporting *any* material by a packing or forcing pressure applied behind a mass of it and a nozzle pressure injected into the front of it.

The present case involves a radically different state of facts.

The apparatus of the Callahan patent involved in those suits consisted essentially of a tower in which the concrete was hoisted to any desired elevation, and movable swinging chutes or conduits through which the concrete was permitted *to gravitate* to various points on the building; *and obviously the gravitation of coal or grain or the like is not essentially different from that of wet concrete.*

The apparatus of the patent here in suit is one for elevating, conveying and placing concrete pneumatically, and the action of the apparatus of the prior art on concrete would be *entirely different* from their action on grain, sand, coal screenings and other light or easily disintegrated material. In fact, as has been abundantly shown, such prior apparatus *would not work at all with concrete*, and apparently none of the prior patentees ever attempted to so use it. Furthermore, the fact that concrete must be handled *without disintegration*, would make the action of the prior devices, if they could be made to operate at all, fatal to the mixture.

It is true that in the *Concrete Appliances* case, in the Third Circuit and in this Court, it was held that adapting the prior devices—with their actual adaptation for concrete begun—for use with wet concrete did not involve invention, once the use of wet concrete came into vogue. But that is not true in the present case, because the prior devices *cannot be adapted* for use with concrete, either wet or dry.

Furthermore, the present apparatus is primarily intended to handle dry concrete, which had been extensively used for at least half a century, and in using it the present invention filled a long existing need.

The patent says that one of the important advantages of it is that "relatively stiff" concrete "containing little or no excess of water"—the ideal mixture—can be used (p. 3, line 42), so that the use of wet concrete *in no way suggested the employment of the invention.*

It is shown by the evidence here that it was the practice to line tunnels with concrete by hand, and that the operation was costly, unsatisfactory, and under some conditions *impossible* (Kirk. Ulen R. 52, 53, 56 and 57). Mr. Kirkland says that in some cases *it could not be done by hand at all* (Q68, Ulen R. 52) and where it could be done (*Id.* 53)—

> "Q70. What is the general character of tunnel lining placed by hand as you have observed it? A. It is not uniform. If it is carefully done, it is a very slow process of course, it is satisfactory. It is likely to be carelessly done and with inefficient men and the human factor enters there a great deal.
>
> "Q71. How about the expense? A. The cost of placing pneumatically is, in ordinary tunnels, not done under air pressure, *from one-half to one-third* of the cost of doing it by hand or by other machines."

and in work done under air pressure the saving is *greater* (Q3, R. 276).

We have here an invention which filled a long felt need—since the Smith patent in 1872 at least—supplanted all other means, and went into universal use.

(Tunnel lining with concrete was practiced at least "as far back as 1880."—*Concrete* v. *Storrie*, R. 110-111.)

The able and learned opinion of Judge SWAN for the Second Circuit Court of Appeals, in this case, very clearly distinguishes the Gomery decision, in the following language (R. 343, 27 Fed. [2nd] 668):

> "It is urged that, because of his [Judge BOURQUIN'S] decision and the case of Concrete Appliance Co. *v.* Gomery, 269 U. S. 177, 46 S. Ct. 42, 70 L. Ed. 222, as well as because of new matter introduced in this record, we should reconsider the validity of the patent.
>
> "The new matter is, of course, open to us and will be dealt with hereafter. The Supreme Court case, however, contains nothing, in our opinion, which casts doubt upon the correctness of the Ulen decision; in fact, it was before us when that decision was made. It holds, affirming the judgment of the Circuit Court of Appeals for the Third Circuit in 291 F. 486, that the Callahan patent, which covered an apparatus operating on the gravity principle for distributing 'wet' concrete, was invalid, because it merely made use of known methods and appliances for the convenient handling of this recently accepted building material. The appellants' argument runs that, since the Supreme Court emphasizes that old apparatus used for distributing water, grain, or coal was readily adaptable for handling concrete, so the prior art patents for blowing sand, grain, or grout, which in the *Ulen* case were held not to invalidate McMichael's patent, should now be deemed com-

plete anticipations of it. But the Gomery decision does not rest merely on the assumption that apparatus for coal and grain could have been used for wet concrete without inventive thought. Adaptations of old carriers to handle concrete were shown to have been frequently made for several years before the application for the patent there in suit. The idea was already of common knowledge and was being applied generally. Therefore Callahan's adaptation was not an invention.

"But that is a very different situation from the one before us in the *Ulen* case, where nobody before McMichael had ever used a pneumatic apparatus to transport concrete."

THE CHICAGO ALLEGED PRIOR USE.

The unaided recollection of two persons after a lapse of twenty-three years is insufficient to establish a prior use defense.

No drawing, sketch, description, memoranda, record or other tangible, visible, contemporaneous evidence has been produced, and the memory of the witnesses is shown to be faulty in various particulars. Their testimony is further substantially contradicted by five others.

Perhaps the leading case on this point is that of *De-Laski & Thropp Co.* v. *Fisk Rubber Co.*, 203 Fed. Rep. 986 (C. C. A. 1st). In this case the Court, referring to the rule requiring tangible evidence, said (p. 993):

> "In Emerson & Norris Co. *v.* Simpson Bros. Corporation, 202 Fed. 747, 750, this court had the issue of anticipation before it. In the opinion of the court, handed down January 30, 1913, Judge PUTNAM reviewed certain cases upon this subject, and said:
>
> " 'The result of all these cases is that, with reference to questions of the class which we have

> here, namely, the identity of structure as between what is patented and what is alleged to have anticipated it, something more than oral testimony, even of the highest character, is required where there has been a considerable lapse of time.'
>
> The cases reviewed were, Brooks *v.* Sacks, 81 Fed. 403, 407, 26 C. C. A. 456; Westinghouse Co. *v.* Stanley Co., 133 Fed. 167, 174, 68 C. C. A. 523; Maxwell Land Grant case, 121 U. S. 325, 381, 382, 7 Sup. Ct. 1015, 30 L. Ed. 949; Morgan *v.* Daniels, 153 U. S. 120, 14 Sup. Ct. 772, 38 L. Ed. 657; Greenwood *v.* Dover, 194 Fed. 91, 114 C. C. A. 169."

And again:

> "In the cases to which we have referred, attention has been called to the practical safeguards which are deemed necessary against the frequently mistaken memory of witnesses as to events long passed. These cases show repeated refusals to sustain the defense of anticipation, in the absence of such testimony as book entries, illustrations, purchases, bills, orders, patterns. This is the kind of evidence which Judge PUTNAM refers to as 'concrete, visible, contemporaneous.'"

Even where visible, tangible evidence is produced the prior use must be established with that degree of certainty as to time and character which precludes reasonable doubt.

> *Deering* v. *Winona Harvester Works,* 155 U. S. 286.

But the Trial Court, after hearing all the witnesses in open Court, found that no prior use was shown (Opinion, R. 327), and that finding of fact is conclusive.

> *Adams* v. *Gilliland,* 242 U. S. 350; 37 Sup. Ct. Rep. 169.

The Court of Appeals also affirmed this finding (R. 345).

(For a discussion of the prior use evidence see Appendix.)

For the foregoing reasons the decision of the Circuit Court of Appeals for the Second Circuit should be affirmed.

Respectfully submitted,

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APPENDIX.

DISCUSSION OF CHICAGO ALLEGED PRIOR USE.

The following is a brief summary of the evidence.

1. The alleged prior use was said to have occurred *twenty-three years back*, and no documentary or other visible evidence was produced to support the verbal statements of the witnesses or to aid their memory. Such a feat of memory as that claimed by the witnesses, who had seen many concrete machines during the intervening twenty-three years, *including the machines of the patent in suit*, appears to be well-nigh *impossible*. It is believed to be a case of memory *reconstructed* both as to dates and facts, under the influence of the present surroundings.

2. The use—whatever it was—was *a mere unsuccessful and abandoned experiment*. The evidence of this is as follows:

> (a) Jackson is alleged to have used the machine only twice, and neither witness saw him use it (the last machine only is said to have been used for concrete) except for a very short time (Artingstall, Q47, R. 41, Fanning R. 132-3), and they had nothing to do with its construction or its operation. *They were mere casual observers.*
>
> (b) Although at least *60 miles* of tunnels were lined *by hand and mostly after* the alleged use, and by slow, laborious and awkward methods (Fanning R. 131), the machine was never used in these tunnels after the first alleged attempt. The attempt of these witnesses to explain away this abandonment by saying that Jackson found the machine more costly than hand placing, merely shows that it was not what they say it was. McMichael's invention very quickly went into ex-

tensive use, is universally used for tunnels today, and saves one-third to one-half of the cost of the work when not done under pressure, and more under pressure.

(c) Jackson was a prolific inventor and patentee (Fanning, Qs166-8, R. 130), and had he even thought that he had produced something useful he surely would have patented it. Certainly when McMichael's machine came out in 1907 and proved so valuable, Jackson would have asserted his right to it, if he thought he had any claim to it at all.

(d) It is admitted that the machine, whatever it was, *was abandoned, "dropped"* until "1907 or 1908," which was after McMichael entered the field and filed his application (Jan. 1907) for the patent in suit (Artingstall, XQ346, R. 85).

A prior use to constitute anticipation, must be

"so far appreciated at the time, and adopted or followed, as to create a well-understood, if not an established, practice, capable at any time of being resorted to, and not something incidental, indefinite, fugitive, which is now hunted up and brought forward simply for the purpose of defeating the patent."

Ajax Metal Co. v. *Bradley Brass Co.*, 155 Fed. 409, 416;

(Cited in *Carson* v. *American Smelting & Refining Co.*, C. C. A. 9th, 11 Fed. (2d) 766, 770, with numerous other cases).

3. The witnesses were shown to be mistaken as to date, and finally admitted it.

Artingstall fixes his date positively as *the year before* his marriage, which was June 18, 1904, and gives circumstances connecting it therewith (Q47, R. 41), and Fanning connects it with a bridge job and an accident which

took him away from Jackson for several days (Qs212-3, R. 137). When confronted with the record evidence showing that the Tunnel Company did not take over the building at 177 East Monroe Street until 1904, they both admit that they were mistaken (R. 199). Had they been shown evidence establishing that the use could not have taken place *until three years later*, no doubt they would have been just as ready to change their testimony to that date. It is evident that they have *no clear recollection* as to the year when they saw this particular machine, as distinguished from many other machines seen by them prior to the completion of the tunnel in 1909, which was years after McMichael entered the field.

4. The witnesses testify that the machine was used for grouting (Fanning R. 132), but it is apparent that a machine for placing grout, a relatively thin, smooth liquid, with a bottom jet such as that described by them, *could not be used*, because it would break up the solid stream of grout into sections divided by air and prevent its use for stopping leaks and crevices (Ray R. 274, Q92). The machine was evidently a grouter like that of the Canniff patent No. 873,345, with a top air inlet only, and possibly with means for letting air into the bottom of the machine *prior* to the discharging operation for *mixing* the grout. Mr. Artingstall says the "concrete" was very wet and like cream (R. 56).

5. At least one of the witnesses, Artingstall, is shown to be undependable. Passing his statement explaining Slade's nonappearance, that Slade "is a very, very old man and very feeble" (R. 81), and its refutation by Slade himself on the stand, he says Slade told him the tunnel records did not go back to 1907 (R. 81), whereas Slade produced tunnel records of 1902 and 1904 (Exhibits 15 to 18, R. 160-162). Again, he said that he told McMichael

in 1911 how to make his machine work by putting a jet at the bottom (R. 55), and this is answered by the patent itself applied for in 1907, which Artingstall evidently had not examined, the published descriptions of McMichael's work and apparatus in 1909, and his 1910 application showing exactly the 1911 machine with bottom inlet. (See Exhibits 12, 13, 14, R. 142-145.)

Artingstall's testimony on the stand differs in various essential particulars from his affidavit made in June, 1926 (Q66, R. 43; R. 71-3, 85, 101). In his affidavit he places the size of the gravel used as up to three-fourths inch diameter, and on the stand says it was up to one and one-half inches (R. 71-3). If it could increase to double its diameter in four months it could increase easily from thin grout to concrete with large aggregates in twenty-three years. He also repeatedly gives the place of use—right in the heart of the Chicago business section—as *Adams* Street (R. 41, 42 and 45), whereas it was *Monroe* Street (R. 55, Q120). This can only be attributed to very faulty memory.

6. Neither of the prior use witnesses had anything to do with the alleged use of the machine except to observe it on one or two occasions, and no reason to study or remember it. In such circumstances their unrefreshed recollection after all these years giving the details of construction and operation cannot be credited. Furthermore, Artingstall's sketch shows a large discharge pipe extending back of the outlet, whereas Fanning cuts its off near the outlet. This is an important detail, and would have to be conclusively established.

7. The reasons of the witness for the alleged use of the machine at 177 East Monroe Street *conflict*, Artingstall explains it by saying that Jackson was a peculiar man and Fanning by saying that he had no mixer there and therefore used this machine to mix. But Artingstall later says

that the materials were mixed for the machine with a shovel (R. 199).

8. Fanning's testimony as to the use in the tunnel is *entirely uncorroborated* and is shown to be impossible. He says that there were air pipes running through the shield or bulkhead carrying the compressed air for pneumatic tools (R. 124, 129, 135-6), and even makes a sketch showing them (Exhibit 11), but the four witnesses who had to do with the construction of the tunnel (this was the part fed by shaft No. 1), Ericson, Slade, Martin and Lynch—while Fanning's place of business was four miles away (R. 126)—state positively that there was no such air supply in the tunnel at any time up to 1907.

9. Mr. Artingstall admits that he received $100 per day and expenses for his services as a witness (Qs 3-7, R. 98), whereas his salary in Chicago is $5,000 per year (R. 147), which is less than $20 per day.

10. Finally, Fanning says that he last saw the machine at Jackson's disposal station excavation (Q95, R. 123), and Martin, who used Jackson's machine there—this was in 1907—states positively that it *was a grouter with top inlet only* (R. 188-9); and in this he is corroborated by Mr. Slade (R. 165).

A summary of the testimony of the rebuttal witnesses only is considered necessary. They are:

John Ericson, City Engineer, under whose general supervision the tunnels were constructed (R. 146).

Alfred Slade, engineer with Jackson on the construction of the tunnel and later chief engineer (R. 156).

John Lynch, City Inspector on the tunnel during the period 1900 to 1907 (R. 178).

Alfred J. Martin, the man who supplied all the concrete for the tunnel lining (R. 188).

Ernest A. Clark, Jackson's chief draftsman and engineer, who had knowledge of all machines made by Jackson at his shops (R. 192).

The witnesses Slade, Martin and Lynch were employed *in the tunnel daily* during the period mentioned, and Ericson inspected it frequently and had the reports on it from his inspectors and engineers.

Collectively their testimony establishes the following facts, among others:

1. That no pneumatic machine was used in the tunnel for placing concrete, or even for placing grout, prior to 1907.

2. That no such machine could have been used because there was no compressed air supply to operate it. The tunnels were dug in clay, which rendered boring and drilling machinery unnecessary. The work was all done by hand.

3. That all the tunnel lining was placed by hand, including the keys of the arches which were laboriously placed and rammed.

4. That if any one had used such a machine in the tunnel during that period they would certainly have known of it.

5. That no such machine was used at 177 East Monroe Street (Slade, R. 159-61) or even located there; that the floor of the basement was not done until the middle of 1904, and was not done by any machine (*id.*, 160-161); and that had such a thing occurred it would certainly have been known.

6. Mr. Clark further shows that after Jackson moved *in 1906* he did start to make a *grouting* machine; that one was made from his sketches and Clark's drawings with a flat bottom, and did not work (R. 192-5); and that sub-

sequently Jackson obtained another machine. It must be apparent that if Jackson had any operative machine—even a grouter—prior to 1907, he would have known how to make one at that time.

The testimony of these witnesses establishes that no such machine as that described by Artingstall and Fanning could have been used by Jackson or any one else prior to 1907, and until after the application for the patent in suit, in January of that year.

Here again we refer to the rule that the finding of the Trial Court, after hearing the witnesses and judging their credibility, that the evidence in support of the alleged prior use is insufficient or has been rebutted is unassailable. In the present case the Trial Court, after hearing the prior use evidence, found that:

> "No contemporary sketches are produced and the two witnesses attempt to describe from memory a mechanism which was not used except on two occasions. If such a practical device as that of the patent in suit had been employed, it is hardly likely that a contractor used to conducting large enterprises would not have sought a patent, or at least have taken advantage of something which in recent years has met with signal success. I am not satisfied that the defendants have established the prior use" (Op. R. 327).

In *Adams* v. *Gilliland*, 242 U. S. 350, 37 Sup. Ct. Rep. 169, 61 L. Ed. 356, this Court passed upon a situation very similar to the present one and said:

> "Considering that a patent has been granted to the plaintiff, the case is pre-eminently one for the application of the practical rule that so far as the finding of the master or judge who saw the witnesses *'depends upon conflicting testimony or upon the credibility of witnesses, or so far as there is any testimony consistent with the finding, it must*

> *be treated as unassailable.'* Davis *v.* Schwartz, 155 U. S. 631, 636, 39 L. Ed. 289, 291, 15 Sup. Ct. Rep. 237. The reasons for requiring the defendant to prove his case *beyond a reasonable doubt* are stated in the case of Barbed Wire Patent (Washburn & M. Mfg. Co. *v.* Beat Em All Barbed Wire Co.), 143 U. S. 275, 284, 36 L. Ed. 154, 158, 12 Sup. Ct. Rep. 443, 450."

If patents could be destroyed by such evidence as the defendants' in this case no patent would have any value.

It is for this reason, among others, and because persons can always be found who will say that a valuable patented device was used before the patentee used it, and will swear—sometimes honestly—that it was, that the courts have established the rule above referred to requiring more than mere oral evidence, and requiring in substance that the prior use must be established *beyond reasonable doubt.*

Not only is it well settled that to invalidate an issued patent prior use must be proved "by evidence so cogent as to leave no reasonable doubt," but it is equally well settled that an abortive experiment given up after a test is not sufficient to anticipate a patent. Perhaps the leading authority is *Deering* v. *Winona Harvester Works,* 155 U. S. 286, in which the Court said (p. 300):

> "As we have had occasion before to observe, oral testimony, unsupported by patents or exhibits, tending to show prior use of a device reguarly patented, is, in the nature of the case, open to grave suspicion. *The Barbed Wire Patent,* 143 U. S. 275. Granting the witnesses to be of the highest character, and never so conscientious in their desire to tell only the truth, the possibility of their being mistaken as to the exact device used, which, though bearing a general resemblance to the one patented,

may differ from it in the very particular which makes it patentable, are such as to render oral testimony peculiarly untrustworthy; particularly so if the testimony be taken after the lapse of years from the time the alleged anticipating device was used. If there be added to this a personal bias, or an incentive to color the testimony in the interest of the party calling the witness, to say nothing of downright perjury, its value is, of course, still more seriously impaired. This case is an apt illustration of the wisdom of the rule requiring such anticipations to be proven by evidence so cogent as to leave no reasonable doubt in the mind of the court, that the transaction occurred substantially as stated. The very exhibit produced by the witness Heller contradicted, so far as it could contradict, his testimony, and the witnesses who ought to have corroborated his story, gave a version which showed it to be untrue in more than one important particular.

"Under the circumstances, it would be going too far to reject his entire testimony, but giving it all the weight to which it can reasonably be entitled, it shows no more than that he affixed some sort of an extension to a butt-adjuster connected with an Appleby machine. If, as he says, in 1878, he tried a rigid extension and found it unserviceable, and subsequently, in the same season, he invented a pivoted extension, and it worked well, it is improbable that he would have cast it aside altogether at the end of the season, and taken up again the theory of a rigid extension, and applied it not only to his own, but to a number of other machines. His excuse that the binder was incapable of doing satisfactory work during the season of 1879, by reason of the shortness of the grain that season, is evidence that it was inoperative. If it had been a success, he would hardly have thrown it aside permanently. Doubtless he did use a rigid extension of some sort; but if he ever used a pivoted device at all—of which we have considerable doubt—his efforts in that di-

> rection must be relegated to the class of unsuccessful and abandoned experiments, which, as we have repeatedly held, do not affect the validity of a subsequent patent. *Corn Planter Patent*, 23 Wall. 181, 211; *Coffin* v. *Ogden*, 18 Wall. 120, 124."

This holding as to burden of proof has been reiterated by the Supreme Court in more recent cases than *T. E. Symington Co.* v. *National Malleable Castings Co.*, 250 U. S. 383, 1921; *Eibel Process Co.* v. *Minnesota & Ontario Paper Co.*, 261 U. S. 45, 1922.

In the *Eibel* case, the latest pronouncement of the Supreme Court on the proof required to establish prior use, the Court said (p. 60):

> "It is true that some witnesses testify that they realized before Eibel's application that speeding up the stock to equal velocity with the wire would solve the difficulty and aid the speed. But there is not a single written record, letter or specification of prior date to Eibel's application that discloses any such discovery by anyone, or the use of the pitch of the wire to aid the speed of the machine. The oral evidence on this point falls far short of being enough to overcome the presumption of novelty from the granting of the patent. The temptation to remember in such cases and the ease with which honest witnesses can convince themselves after many years of having had a conception at the basis of a valuable patent, are well known in this branch of law, and have properly led to a rule that evidence to prove prior discovery must be clear and satisfactory."

The rule so frequently stated by this Court has been reiterated and applied by this Court as recently as February, 1925, in *International Cork* v. *New Process Co.*, 6 Fed. (2nd) 420.

This Court in *Greenwald Bros.* v. *La Vogue Petticoat Co.*, 226 Fed. 448, said through Judge LACOMBE (p. 453):

> "As to the defense of prior use which has been interposed, it is to be remarked that there are two features as to which the proof must be satisfactory;
>
> "(1) The identity of the alleged prior structure with that of the patent must be shown;
>
> "(2) And the date at which the alleged prior structure was made must also be disclosed."

A most interesting case is the decision of his Honor, Judge LEARNED HAND, rendered in 1920 in *Kalamazoo Loose Leaf Binder Co.* v. *Wilson Jones Loose Leaf Co.*, 286 Fed. 715, S. D. New York, 1920. The invention in issue in that case represented a very slight advance over the admitted prior art, not a radical departure involving a new mode of operation as in the case at bar. It was a change which it was very probable would have been made. Judge HAND, however, while he said (p. 718) that the testimony "really persuades the Judge who saw the witnesses" refused to accept it as sufficient to invalidate the patent in suit and said (p. 717):

> "It is very probable that this modification the defendant actually perfected in the summer 1914, and one of the issues in the case turns upon whether the proof is adequate for that purpose. Nevertheless, although I have really no doubt that this was in fact done, I think the proof scarcely comes up to the severe standard imposed in such cases. There is no documentary corroboration of it, and the testimony of the witnesses, though unimpeached, is not supported by any circumstances which put it beyond the inevitable infirmities of their recollection. The most recent declaration of the Supreme Court, in Symington *v.* Nat. Castings Co., 250 U. S. 383, 39 Sup. Ct. 542, 63 L. Ed. 1045, shows no disposition to relax the well-established canon, and I decline to consider the use as proved."

In *Brown* v. *Zaubits*, 105 Fed. 242, S. D. New York, 1900,

the circumstances as stated by Judge COXE were as follows:

> "The defendant has called eight witnesses to corroborate his statements. They were examined in 1898 and testified regarding matters which transpired from five to eleven years before. The general course of the examination was to place in their hands the infringing pyrometer and ask them to compare it with the pyrometers which they saw eight, nine or ten years previous."

Judge COXE then said:

> "It is not necessary to denounce these witnesses as perjurers. * * * The desire to aid a friend, the actual presence of the infringing pyrometer, and the assurance of the defendant that the prior pyrometers were like it in structure may have encouraged imagination to encroach upon the domain of fact but this is a condition frequently encountered in patent causes. The witnesses may honestly have thought that they saw the platinum strip in a pyrometer made by the defendant prior to 1892. They are in all probability mistaken, but at least, there is a doubt about it and this doubt destroys the force of the defense."

Among other cases are *H. Mueller Mfg. Co.* v. *Glauber* (C. C. A. 7th), 184 Fed. 609; *Ecaubert* v. *Appleton*, 67 Fed. 917, 920 (C. C. A. 2nd), and *Howe* v. *Underwood* (the sewing machine case), 1 Fisher 160, Fed. Cas. 6775.

THE METHOD CLAIMS ARE FOR A VALID METHOD OR PROCESS.

A process to be valid need not change the character of the thing acted upon. It is sufficient if it changes the shape or position of the thing, or effects any other useful purpose. The decision in *Cochran* v. *Deener* does not make any particular *kind* of change necessary.

In *Kennedy* v. *Beaver*, 232 Fed. 477 (not appealed), Judge LEARNED HAND said (p. 278):

> "In Cochran *v.* Deener, 94 U. S. 780, 24 L. Ed. 139, the Supreme Court said that an art was an act or series of acts performed upon a subject-matter which was transformed or reduced to a different state or thing. The last expression of the court is Expanded Metal Co. *v.* Bradford, 214 U. S. 366, 29 Sup. Ct. 652, 53 L. Ed. 1034, in which the court disclaims any intention, as in Cochran *v.* Deener, of confining a process patent to a change in chemical substance. Even if an 'art' requires that the old elements be transformed into some new thing, *a new thing may be created merely from mechanical readjustments or the new juxtaposition of parts.* In this case a floor results from the laying of tiles under pressure, and such a floor is a different thing from cork tiles and brads and underflooring. The method of creating such a floor from such elements is surely a patentable process."

In the present case the concrete mixture is discharged, conveyed and placed to form walls or other parts of tunnels, or other structures, and in such operation is preserved against separation and even more intimately mixed.

Neither the constitution nor the patent statute (Sec. 4886, U. S. R. S.) requires that a process, which in the language of the statute is an "art," shall produce any particular *kind* of result, so long as that result is new and useful.

Mr. Justice CURTIS, speaking of a process for the majority of the court in the case of *Winans* v. *Denmead*, 56 U. S. (15 How.) 329, 340 (14 L. Ed. 717), said:

> "Its substance is a new mode of operation, by means of which a new result is obtained. *It is this new mode of operation which gives it the character*

> *of an invention*, and entitles the inventor to a patent; and this new mode of operation is, in view of the patent law, the thing entitled to protection."

Mr. Justice BRADLEY said in the case of *Tilghman* v. *Proctor*, 102 U. S. 707, 728 (26 L. Ed. 279), quoting from the opinion of Chief Justice TANEY in the case of *O'Reilly* v. *Morse*, 56 U. S. (15 How.) 61, 62; 14 L. Ed. 601:

> "Whoever discovers that a certain useful result will be produced in any art by the use of certain means is entitled to a patent for it, provided he specifies the means. But everything turns on the force and meaning of the word 'means.' It is very certain that the means need not be a machine, or an apparatus; it may, as the court says, be a process. A machine is a thing. *A process is an act, or mode of acting.* The one is visible to the eye, an object of perpetual observation. The other is a conception of the mind, seen only by its effects when being executed or performed."

This question seems to be disposed of in the present case by the following considerations:

1. That other machines or mechanisms may be used to practice the method or process.

Thus, "introducing compressed air behind the mass of materials" may be done in various ways. The defendants' apparatus in the *Ulen* case shows a plunger or pusher advancing in the closed chamber, which compresses the air therein and introduces such compressed air behind the mass. If the compressed air inlet at the top, which introduces additional compressed air behind the mass, were omitted we would have a means for introducing air behind the mass not shown in the patent and not "a compressed air *inlet pipe*" as specified in some of the apparatus claims.

Thus also compressed air may be introduced "behind the portion thereof lying adjacent the conduit" by means of a piston near the outlet and in communication therewith, and this would not be "another compressed air inlet pipe leading through the chamber wall and terminating within the chamber near the opening into the conduit," as specified in Apparatus Claim 2, as the compressed air would originate within the chamber itself. Again the rapid intermittent action of the compressed air jet at the outlet might be brought about by a reciprocating piston controlled automatically, like the piston of a steam engine, or by hand.

Again, in the present case, the petitioners' compressed air behind the mass was introduced by the bottom air inlet and not by the top air inlet, after the top air was disconnected. This was another method of practicing the process or method, and was not covered by the claims drawn to the specific form of apparatus shown in the patent.

It is also conceivable that "closing the receptacle," as specified in Method Claim 4, might be brought about by other means than the door 5, as, for instance, by applying the end of a compressed air conduit to the opening 3 after the concrete is placed therein.

And various other changes in the mechanism might be made, which would make it quite different in construction and specific functions and yet adapt it to the full performance of the method. In fact, the entire machine could be reorganized and built along different lines.

2. The practice of the method or process must be brought about by human intelligence and by manipulation of the controls for the forces employed by the machine.

Thus, the door must be closed by manipulation of its chain or in some other manner. In the machine shown, the valve 9 must be opened to admit compressed air be-

hind the mass, and the valve 11 opened to admit compressed air behind the portion of the mass adjacent the conduit. The air compressor 7 must also be operated to create a supply of compressed air. All these operations must be performed by hand or by some other means *to put in operation and maintain the action of the process.*

The machine shown will not operate to practice the method unless it is properly controlled and manipulated. Thus variations in the exact nature of the concrete and in the conditions of the work will require variations in the control of the apparatus known to the skilled operator (see Bateman, Q53, Ulen R. 117).

For the foregoing reasons it is obvious that the method or process is not the mere function of the machine, but is "a mode of operation" in which the machine may be employed.

His Honor Judge AUGUSTUS N. HAND, in disposing of this question, said:

> "The process claims are limited to no particular form of apparatus so that the contention that they are for a mere function seems without merit. Expanded Metal *v.* Bradford, 214 U. S. 366; Buffalo Forge Co. *v.* City of Buffalo, 255 Fed. 83."

The distinction between a patentable method or process and the mere function of a machine is well brought out by these authorities.

In *Corning* v. *Burden* 15 How. 252; 14 L. Ed. 683, Mr. Justice GRIER, said:

> "But it is well settled that a man cannot have a patent for the function or *abstract effect* of a machine, but only for the machine which produces it."

And in *National Hollow B. B. Co.* v. *Interchangeable*

B. B. Co., 106 Fed. 693, 708, the claims were for "the turning of the nuts upon the ends of the tension rods or member of the beam," etc., and the Court said that this was "one of the products or functions of the air-brake beam," and that the "spring or resilience" of the beam could not be patented.

Referring to this case the Court of Appeals for the 8th Circuit in *Denning Wire & Fence Co.* v. *American Steel & Wire Co.*, 169 Fed. 793, 797, said:

> "There, the attempt was to monopolize the function or operation of a device *acting upon, or within, itself*, and not a device or machine designed to act upon something external to itself."

In that case the Court seeking a definition of the term "mere function of a machine" stated that one that would apply to all cases could hardly be formulated, and

> "But for the present purposes it may be said to be that power or property of the machine of acting in the specific manner designed or intended by its construction; in other words, that which the machine is designed to do, as distinguished from the machine itself, and from the product of its action upon something external to itself."

These and other authorities are to the effect that a patent may be had for the machine, but not for the mere operation or function of the machine. *They do not, however, deny the right to an inventor to patent a new and useful method or process of producing a certain result regardless of the particular character of the means employed in its production.*

As the Court of Appeals said in *Buffalo Forge Co.* v. *City of Buffalo*, 255 Fed. 83, 87:

> "If it is not reasonably possible to separate the alleged process from the disclosed means, the for-

mer can hardly be more than the function (or at least a function) of the latter. This is no more than applying the doctrine of Leeds *v.* Victor, etc., Co., 213 U. S. at page 318, 29 Sup. Ct. at page 500, 53 L. Ed. 805:

> "'A process and an apparatus by which it is performed are distinct things. They may be found in one patent; they may be made the subject of different patents.'
>
> "If such difference *cannot be discovered*, they cannot be two things; therefore they must be one thing, *i. e.*, one invention, and that one is usually the means.
>
> "*But that the means, and the only means of applying the process, are strictly mechanical, is a matter of no moment, so far as patentability is concerned.* If the process, when distinguished from the means of performing it, is new, useful and intellectually rises to the dignity of invention, it is patentable—if it falls within the meaning of the word 'art' as used in the statute."

Finally, this Court in *Expanded Metal Co.* v. *Bradford*, 214 U. S. 366; 53 L. Ed. 1034, holding valid the Golding patent for a method of cutting and stretching sheet metal, performed wholly by the automatic and mechanical operation of a machine, said:

> "This Court, speaking through Mr. Chief Justice WAITE, sustained a patent in the *Telephone* cases, 126 U. S. 1, 31 L. Ed. 863, 8 Sup. Ct. Rep. 778, for a method of transmitting electrical undulations similar in form to the vibrations of the air accompanying vocal sounds, and at the same time the patent for the apparatus by which the method was operated was sustained.
>
> "In Leeds &c. Co. *v.* Victor Talking Mach. Co., decided at this term, 213 U. S. 301, 318, *ante*, 495, 500, 29 Sup. Ct. Rep. 495, 500, this court said: 'A process and an apparatus by which it is performed

> are distinct things. *They may be found in one patent*; they may be made the subject of different patents.'
>
> "*We therefore reach the conclusion that an invention or discovery of a process or method involving mechanical operations, and producing a new and useful result, may be within the protection of the Federal statute, and entitle the inventor to a patent for his discovery.*
>
> "We are of the opinion that Golding's method was a substantial improvement of this character, independently of particular mechanisms for performing it, and the patent in suit is valid as exhibiting a process of a new and useful kind."

It is thus settled that if a new and useful process or method of operating or acting upon any material to produce a certain result is the subject of a patent, the patent is valid regardless of whether that result is produced by the automatic operation of a machine or in other manner.

This, we submit, has been the law from the beginning, although it seems at times to have been obscured to some extent by decisions in particular cases in which no method or process was invented, but merely a machine, and an attempt made to patent the machine as a process by claiming its mere function or way of operating. This is shown by the decision in the *Telephone* cases (126 U. S. 1) referred to in the *Expanded Metal* case (*supra*), in which the Supreme Court sustained the following claim of the Bell patent:

> "The method of, and apparatus for, transmitting vocal or other sounds telegraphically, as herein described, by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth."

It will be seen that the method set forth in Bell's claim

is similar to the method claims in the present case, though of much broader and more general scope; that it was carried out by the automatic operation of certain apparatus; and that it did not change the character of any physical thing.

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Counsel for Respondents.

(End of Appendix.)

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SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1930

No. 3

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK
Defendants-Petitioners

v.

CONCRETE MIXING AND CONVEYING COMPANY
Plaintiff-Respondent

Respondent's Reply to Supplemental Brief for Petitioners on Reargument

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IN THE

SUPREME COURT OF THE UNITED STATES

POWERS-KENNEDY CONTRACTING CORPORATION and ANTHONY G. FLECK, *Defendants-Petitioners,* v. CONCRETE MIXING AND CONVEYING COMPANY, *Plaintiff-Respondent.*	No. 3. OCTOBER TERM, 1930.

RESPONDENT'S REPLY TO SUPPLEMENTAL BRIEF FOR PETITIONERS ON REARGUMENT.

The issues before the court are fully discussed in respondent's main brief herein (formerly No. 501, Oct. Term, 1928), to which the court is referred for a full presentation of respondent's case. This supplemental brief is limited to the questions presented in petitioners' supplemental brief, filed October, 1930.

The petitioners, evidently feeling that the facts in their case are not adequately presented in their main brief, and that these facts are not sufficient to support their contentions, have filed a supplemental brief setting forth new arguments presenting facts chiefly found in the record of the companion case (No. 4, formerly No. 528, Oct. Term, 1928). The following is therefore a reply thereto.

I.

The alleged prior use in this case was rejected by the trial court on conflicting oral evidence introduced in open court.

The alleged prior use in the companion or *"Storrie"* case was accepted by the trial court on a single uncorroborated and unsubstantiated deposition only, taken before the trial out of court, and this deposition concedes that the alleged prior use lacked the vital and essential jet at the outlet of the patent in suit.

The decision of the trial court in the present case, who saw the witnesses and judged their character and credibility, is therefore conclusive.

The decision of the trial court in the companion case, who did not see the witness and had no opportunity to judge his character or credibility, and overlooked the vital defect in that deposition, is inconclusive and should be reversed.

This court is as well able to judge the weight and sufficiency of that deposition as was the trial court.

There is, therefore, no inconsistency in respondent's position that as to the alleged prior use in the present case, the finding of the trial court is conclusive, whereas the finding of the trial court in the other case is not conclusive, but on the contrary may clearly be found erroneous.

Both positions are fully supported by the authorities.

Thus the respondent's position in this case is supported by such decisions as—

> *Adamson* v. *Gilliland*, 242 U. S. 350; 37 Sup. Ct. Rep. 169, 171;
>
> *Davis* v. *Schwartz*, 156 U. S. 631; 15 Sup. Ct. Rep. 237,

and other authorities.

And the respondent's (Petitioners there) position in the other case is supported by such authorities as—

Eibel Process Co. v. *Minnesota & Ontario Paper Co.*, 261 U. S. 45;

Singer Mfg. Co. v. *Herman Cramer*, 192 U. S. 265, 275; 24 Sup. Ct. 291;

Western v. *Robertson*, 142 Fed. 471; 73 C. C. A. 587;

Sanitary Refrigerator Co. v. *Winters*, 280 U. S. ; 74 L. Ed. (Advance Opinions, Nov. 1, 1929, Decided Oct. 14, 1929).

I (a).

Furthermore, the finding of the trial court in the other (*Storrie*) case was contrary to the rule in this court that a prior use to invalidate an issued patent must be proved "by evidence so cogent as to leave no reasonable doubt."

Derring v. *Winona Works*, 155 U. S. 286, 300;

T. H. Symington Co. v. *National Malleable Castings Co.*, 250 U. S. 383, 386;

Eibel Process Co. v. *Minnesota & Ontario Paper Co.*, 261 U. S. 45, 60.

The single deposition in the present case was not only purely recollection of the witness who gave it—after a lapse of more than twenty-two years—and unsubstantiated by any contemporaneous record or other tangible thing, but contains a frank *admission* by that witness (R. 598, *Storrie* case) that the experimental apparatus had no "air on the bottom," *the vital and essential feature* of the patent in suit and its claims.

I (b).

There was no corroboration or substantiation of the Leake prior use deposition.

The three documents referred to by the courts in the Ninth Circuit (see Op., Storrie R. 669) all originated *years after* Leake's alleged prior use and *more than a year after McMichael had made a full and complete reduction to practice* of his invention by filing his application for the patent in suit (Jan. 14, 1907), which was approximately nine months before Leake filed his application (Oct. 7, 1907, *Id.*, Exbt. Bk., 454 and 332).

These documents and the reasons for their utter lack of value are as follows:

1. Leake's preliminary statement in the interference with one Darley (*Id.* 582) involving his application which was also in interference with McMichael.

This was an *ex parte* statement made in 1909, more than *two years* after McMichael's application for the patent, and nearly *four years* after the alleged prior use, and was never substantiated in the interference, which was decided against Leake and in favor of McMichael as the true and prior inventor (Jan. 29, 1910, *Id.* 405). The decision was accepted by Leake, who thereupon *cancelled the claims* which were in the interference—and all claim to the present invention (*Id.* 409-10)—and thereafter contented himself with claiming certain relatively unimportant details of his apparatus which were additions to or alleged refinements of the basic apparatus of the patent in suit (see Leake pat. *Id.* 455).

2. An *ex parte* statement by Leake's attorneys made during the prosecution of his application, *and in 1908*, that Leake had "successfully moved concrete" by "air pressure" and had "actually constructed several plants" where it was done by the apparatus of his application (*Id.* 368, 378).

This laudatory, unverified *ex parte*—and probably hearsay—statement was made by Leake's attorneys *more than a year* after McMichael's application and after Leake presumably had every opportunity to learn all about McMichael's invention. The statement does not say *when* Leake did this, and even if true and supported by proof would not even tend to show that Leake made anything prior to McMichael's application.

Leake himself *admits* that the apparatus made by him for practical use was made after McMichael's reduction of the invention to practice in his application—"sometime in 1907, or so" or in "07 or 08" (Storrie R. 597, 603-4)—also that it was different from this earlier thing which was "nothing but a crude machine" (*Id.* 586); had "nothing automatic," and differed from his *later* machine in that the latter "takes air in on the bottom and top both" (*Id.* 598).

3. The assignment by Leake to McMichael's attorney of his application.

This was made December 2, 1910 (Storrie R. Exbt. Bk. 479), *more than nine months after* he lost the interference to McMichael and actually relinquished all claims to the present invention, conceding McMichael to be entitled to it as the prior inventor (*Id.* 409-10).

There was no understanding or agreement leading up to this, and the reason for the purchase was obviously that Leake showed in his application some later additions or "improvements" which could be used in connection with the McMichael invention, including duplex charging hoppers, and agitators.

And at the time of the assignment there was no claim in the Leake application—nor has there ever been since—which conflicted with McMichael's claims to the invention here involved.

This document, instead of being "strongly suggestive of the inference that McMichael recognized the priority of

Leake's invention," *supports an inference to the contrary.* It indicates that McMichael's interests were in control of both applications, and in position to issue a patent with broad claims to the invention *on either application* to themselves. The fact that they chose to issue the broad patent on McMichael's application, *indicates that they knew McMichael to be the prior inventor.*

McMichael died prior to 1925 (Ulen R., Kirkland dep., Exbt. D, Q96, p. 56); and to sustain an attempt to destroy his adjudged prior inventorship by such documents as these, after a lapse of twenty-two years, is, we submit with respect, repugnant "to every Anglo-American legal concept" of evidence.

> *General Electric Co.* v. *P. R. Mallory Co.* (C. C. A. 2nd), 298 Fed. 579, 585.

As the court also said in that case, in similar circumstances, such a thing is not only "repugnant" "to every Anglo-American legal concept," but something so unfair that anything more unfair cannot be imagined (p. 586).

I (c).

But, as we have seen, Leake himself in his deposition admitted frankly and freely (R. 598, etc.), that his "crude," experimental thing, which he dismantled after he had made a test with it (R. 586), had no "air on the bottom" (R. 598), and that it therefore lacked the vital and indispensable feature of the present invention.

Comparing it with the machine made by him *after* McMichael had occupied the field, he says, referring to this later machine, that it *was not the same in principle.* And answering a very improper question by which it was attempted to lead him into saying that it was, he says:

> "Oh, no. This (the second Leake machine made long after McMichael's filing date) takes air on the bottom and top both,"

and further that with the earlier apparatus:

> "All I did was push the air right out through."

The sketch made by Leake to illustrate his early experimental apparatus also shows *no nozzle at the outlet.* See Defendant's Chicago Exhibit 127 (Exbt. Bk., p. 694).

But had Leake attempted to say that the apparatus tested by him in September, 1905 (R. 583), embodied the invention of the patent in suit, it would have been completely overcome by Leake's oath made more than two years later, in 1907, and forming a part of his application for patent (R., Exbt. Bk. 335), that it had not been publicly used more than two years prior to his application.

But Leake expressly admits that the crude thing tried by him in 1905 at New Orleans and represented by his sketch (Exbt. 127) was used *"only as an experiment"* (R. 602), and was a "little temporary" affair (R. 604) which he tore down after he had used (R. 586).

Nor was Mr. Leake at all reluctant to testify against the present owners of his patent, to whose assignor he assigned many years ago. He shows a willingness to testify fully to the facts, as he recalls them, after a lapse of twenty-two years, but cannot be induced to make statements which he knows to be untrue, or testify to facts which are beyond his recollection.

Leake does not even know who owns his patent (R. 599).

And it is more reasonable to suppose that he was inclined to favor such a powerful interest as the defendant in the other suit, the Great Western Power Company, for whom he first made a deposition (R. 590) than the unknown present owners of his application.

I (d).

On the matter of infringement there was no question of fact before the lower courts in either case, except as to the *operation* of the defendants' apparatus.

In both cases the construction of the accused apparatus was admitted by the defendants (Powers-Kennedy, R. 292, 3, 4; Storrie R., Exbt. Bk. 78, 83-8, 683-4).

The illustration on page 78 of the Storrie case Exhibit book is that of the patent granted to the maker of defendants' machine, Hackley, and is substantially the same as his original drawing forming part of Exhibit 12 (p. 83) which Hackley says shows the defendants' apparatus (R. 73-6). All these illustrations show the air inlets—17, 28ª, etc.—at the back of the vessel, and behind the mass of concrete therein, and the air jets—14, 25ª, etc.—at the outlet of the vessel.

It is admitted that this Hackley patent does "illustrate and describe" the defendants' "Hackley" machine (Respondents' brief, Storrie case, p. 8).

Even the drawing submitted by defendants-respondents' counsel on page 2 of his brief shows these same air inlets —4 and 1—at the back of the vessel and at the front outlet, respectively, **and the District Court in the Ninth Circuit finds these elements present** (Op., R. 614).

In the Second Circuit the courts held, on conflicting evidence, that the defendants' apparatus was operated by them in such a manner as to practice the method or process specified in certain claims of the patent. They also held that the admitted structure infringed the structural claims; and as to this there can be no question since the defendants' structure corresponds to every feature of the machine shown in the patent itself.

In the Ninth Circuit only the structural claims were involved. The controversy as to the particular way in

which the patented device and the accused device operated, was therefore somewhat beside the mark. It arose out of the plaintiff's evidence tending to show that the result accomplished was due to a peculiar action inside the apparatus, known as the slug movement, which evidence was controverted by the defendants. But as the court in the Second Circuit noted this is not material (Opinion, Powers-Kennedy R. 346-7), saying further:

> "To us the dispute seems irrelevant. The patent says nothing which commits the patentee to the slug method of operation."

Therefore, the holding of non-infringement in the Ninth Circuit was due to the fact that the court held the patent *limited to something not described, shown or claimed therein*, and which the court in the Second Circuit holds—and rightly—is *irrelevant*, because the patent is in no way limited thereto.

The court in the Ninth Circuit, therefore, held, that the admitted *apparatus* did not infringe the claims for that *apparatus* because it did not produce the *irrelevant* slug action. This was a decision of *law*. It was an interpretation of the patent as a matter of law.

The court in the Ninth Circuit notes that Hackley himself found the operation of the two machines the same. They say:

> "He testified to having had experience in using appellant's combination and that in so using it the concrete issued in a continuous stream and that in the use of his own device the concrete came out in a continuous stream mixed with air * * *" (Opinion).

They further say, at the end of the Opinion:

> "We think that the slug theory, when all is said, has no bearing upon the merits of the present controversy, for whether or not the appellant's appa-

> ratus operated to deliver concrete in slugs or sections, it is very clear that the Hackley apparatus operates in delivering a constant stream of concrete, interrupted only so far as it is interfered with by the air which accompanies it through the discharge pipe."

But, on what ground they found non-infringement by the *apparatus* of the *apparatus* claims which clearly read upon it, they do not say. They merely affirm the decision of the lower court (R. 621) which found non-infringement because the defendants' apparatus did not have the following four unspecified elements:

1. "Upright cylindrical hopper bottomed container,"
2. "The U bend,"
3. "Upper air save some incidental back pressure,"
4. "Discharge slug fashion as claimed is the invention of McMichael,".

None of these elements is found in the claims of the patent, and none of them is essential to the embodiment of the invention.

The patent does not even call for "upper air." The method or process claims do call for "air *behind* the mass of material" (Claim 4); but this may be upper or rear or in any other place, so long as it is *behind* the mass. However, these method or process claims were not involved in the Storrie suit. But the "incidental back pressure" *is and must be a* pressure behind the mass.

It is evident, therefore, that the courts in the Ninth Circuit held non-infringement, not because of any question of involving features of the patented invention, but because of an error of law in interpreting that invention to include something not included and not intended to be included even in the method claims.

This brings the present case clearly under the language of the decision of this court in

Sanitary Refrigerator Co. v. *Winters* (*supra*),

in which it was said:

> "Furthermore, upon the undisputed evidence the question of infringement resolves itself in each case into one of law, depending upon a comparison between the structure disclosed on the face of the patent and the device shown in the Dent batch, and the correct application thereto of the rule of equivalency. Compare Singer Mfg. Co. *v.* Cramer, 192 U. S. 265, 275, 48 L. Ed. 437, 443, 24 Sup. Ct. Rep. 291."

I (e).

That the two alleged infringing structures are substantially the same, and both substantially the same as that of the patent, will be apparent from a mere comparison of them.

The illustrative embodiment shown in the patent is an upright or vertical chamber or vessel, and the embodiment of the defendants in the *Storrie* case is a horizontal chamber or vessel, like the infringing device in the Ulen suit (12 Fed. [2nd] 929-931), while the defendant's embodiment in the *Powers-Kennedy* case is a vertical or upright vessel.

> (See sheet of drawings, p. 76, Petitioner's Storrie case, brief.)

It will be apparent, however, that if the device of the patent is laid on its side, or the Storrie (Hackley) apparatus placed in upright position with its outlet at the bottom, the two are substantially identical in all essentials. The only difference in the operation due to the change of position is that when the chamber is horizontal some means must be provided for moving the mass of materials toward the outlet, this being done by gravity when the chamber is upright. In the Ulen infringing apparatus, this was done by means of a plunger which pushed the

material forward toward the outlet. In the Storrie apparatus, it is done by air pipes in the bottom of the vessel located between the rear end and the outlet. In the horizontal machine made by the licensee (The Ransome Company) under the patent, this is done by a screw conveyor (Storrie R., Exbt. Bk. 102-105).

But whether the vessel is upright or horizontal, the construction and arrangement of the air pressure devices and the vessel, and the result, are the same.

Thus, in the patent, air pressure behind the mass is supplied by the upper air pipe (8) near the head of the vessel, and the velocity nozzle at the outlet (10) is the pipe extending into the neck of the vessel. In the Storrie device the air pressure behind the mass is supplied by the pipe entering through the head at its lower part, and the velocity nozzle is the pipe extending into the neck of the vessel. The air pipes in the bottom of the vessel will also supply air pressure behind the mass, but would not alone and without the air pipe in the head or back end move all the concrete forward to the outlet.

In the Powers-Kennedy apparatus, pressure behind the mass was first supplied by the pipes at the top of the vessel, and, later, by air exploding upward from the outlet nozzle and being trapped in the top, and the velocity nozzle at the outlet is the pipe entering the neck of the vessel where it joins the conveying conduit.

Only a part of the patent's claims are limited to any location of the air inlet for supplying air behind the mass. The sealed chamber will always *trap compressed air behind this mass, no matter where the air inlet is located,* and the velocity nozzle at the outlet will supply this, if it is not supplied by a separate pipe.

Accordingly, the courts in the Second Circuit found that the defendants infringed all the claims when they used the top inlet and only a part of them when they used the

nozzle at the outlet only (Opinion, R. 328, and [D. C.] R. 327). It was admitted that there was pressure behind the mass in the Powers-Kennedy device when only the nozzle at the outlet was used, and the court so held (*Id.* R. 347—bottom).

In all of the claims which are involved in both suits the "chamber for containing concrete forming materials" with an outlet and a "compressed air inlet pipe leading through the chamber wall and terminating" "near the opening into the conduit," or their equivalents (Claim 2) with means for supplying compressed air "back of [or "behind"] the mass of materials" (Claims 4 and 17) or its equivalent, *are essentials.* These essentials are found in the apparatus of both defendants. **Therefore no different interpretation of the claims is necessary to bring these two devices within their proper and intended scope and meaning.**

The vital and essential element in all the claims common to both suits, is **the nozzle at the outlet cooperating with the pressure behind the mass. This is fully embodied in the apparatus of both defendants, and is not found in the prior art.** Therefore, both defendants have appropriated the essence of the invention and the features which distinguish it from all prior devices, and have enabled it to convey concrete pneumatically, *which these prior devices were unable to do.*

II.

The patent is for a pioneer invention.

No prior device ever conveyed concrete by compressed air in any manner (Opinion, 2nd C. C. A., R. 344).

No prior device ever employed ("static") pressure behind a mass of concrete in a chamber with ("velocity") pressure directed into the mass at the outlet of the chamber.

It was this combination of static and velocity pressure that made the conveyance of concrete by air pressure possible.

Apparently no prior inventor thought that the mass of rocks filled in with mortar which constitutes concrete (see Pat., p. 2, lines 100, *et seq.*) could be conveyed by air pressure. The desirability of such a thing was realized for at least thirty-five years before McMichael's invention, when Smith, in 1872, proposed to convey "concrete" *in water, as a fluid* (Smith Pats., Storrie R. 481-485), which, of course, would have *destroyed the concrete.*

This mass of rocks intimately mixed with sand and cement could not be blown by a blast of air, like sand, grain and other finely divided substances, because it could not be carried in an air current at any obtainable pressure, and would simply jam and plug the conduit after the light fine material had been blown out of it, and if this could have been done it would have *unmixed* the concrete (Opinion D. C., Powers-Kennedy, R. 327).

Nor could this mass of rocks be forced through a conduit like a liquid, because it is, and must be, at least *90 per cent. solids and 55 per cent. rocks* (Robinson, Storrie R. 351; Powers-Kennedy Spec., R. 296; Kennedy R. 206), *and rocks will not flow.*

If any prior inventor ever thought of using a velocity jet at the outlet of the vessel to cause this rocky mass to shoot through the conveying conduit under the air pressure behind it (it would otherwise do nothing but make it jam and plug the pipe) he apparently did not think it worth trying out. Even after McMichael did it engineers would not believe it (Ulen R. 45).

It remained for McMichael to discover that this heavy, rocky mass could be conveyed through a conduit by air pressure by placing a velocity jet at the outlet of the vessel to break up the mass and make it shoot through the conveying conduit and to great distances and elevations

(see Respondents' Main Brief, pp. 15-32, and Storrie R. 105-7).

His invention has accomplished a great work, has gone into universal use, has made possible great enterprises attended by the greatest difficulties, and under the most adverse conditions (*Id.* pp. 32-36; Ulen Op., D. C., 12 Fed. [2nd] 929, 931), and has supplanted all other methods of tunnel lining (Storrie R. 101-3).

It is seldom that a patent has come before this court with such a record of accomplishment, preceded by such an utter failure of accomplishment.

The courts in the Ninth Circuit failed to appreciate this record, and apparently failed to grasp the true nature of the invention. They appear to have overlooked *the very essence of the invention,* which resides in *the duofold pressure behind the mass and at the front of the mass.* At any rate, in comparing the patent with the prior art, they ignored the critical character of the velocity nozzle at the front of the mass and held the invention substantially anticipated by apparatus in which this element was entirely lacking.

Thus the court says in its opinion, referring to the Smith machine, that it contained all the features of appellants' patent "*except* the nozzle for admission of air near the point of exit," and in comparing it with the Duckham patent, which also lacked this element or any suggestion of it, that one of his pipes for the admission of compressed air in the tank (nowhere near the outlet) was "*locatable* at the exit."

As well might one say that Shakespeare's play of Hamlet was anticipated by an earlier play which had all the characters "except the Prince of Denmark," or that an earlier play anticipated it because it could have portrayed such a character as Shakespeare portrayed it. As well might it be said that one who has located an oil well in a widely extended territory, where others were drilling

without success, is not entitled to the reward of his discovery, because the drill holes of the others were "locatable" in the same spot.

II (a).

That all the prior patents and practices lack this vital and essential jet at the outlet of the pressure chamber is sufficiently shown by the following brief summary.

The Duckham British patents 4,400 of 1875 and 15,348 of 1885 (Storrie Exbt. Bk. 598, 603 and 611) propose to discharge water and mud from the huge barge tank of a dredge by putting air pressure on the tank and thus depositing it on the shore. No other means for discharging is shown or described in the 1875 patent, but the suggestion is made (*Id.* 601) that

> "I *prefer* to inject compressed air (with or without an admixture of water) supplied by force pump or other means through a number of nozzles at the bottom of the tank, said nozzles being pointed *towards* the outlet."

But where located and how many feet from the outlet is not stated. He says:

> "By this means the particles are prevented from settling, and are *kept in suspension* until the whole is expelled from the tank. Compressed air *may* moreover be admitted into the discharge pipe with the same object."

The 1885 patent, referring to the 1875 apparatus, says that the discharge was

> "assisted by compressed air and water injected at the bottom of the tank for the purpose of *agitating the mud* and preventing thick deposit" (*Id.* 608). (All Italics in quotations ours.)

The purpose of the nozzles, therefore, was to *agitate the mud* and prevent it from settling on the bottom. They had no other function. If located at the outlet from the tank into the discharge pipe in the form of nozzles, *they would have interfered with the discharge* by blowing through and breaking up the column of liquid, "escaping through the discharge pipe and carrying with it all the liquid" (see Opinion, 9th C. C. A., 1887 article) mixed with mud, leaving the heavier portions of the mixture behind.

The article referred to by the court in the Ninth Circuit says, that blowing through clay or stiff mud by the pipes in the bottom of the tank "was easily rectified by re-arranging and *increasing the size of the* large injection nozzles." This means that they were *not velocity nozzles at all,* but compressed air inlets delivering a large volume of air which would *spread out and bubble up through the mud.*

That no such location or function as that of the patent in suit was ever thought of, is shown by Duckham's statement (*Id.* 599, 601):

> "To prevent the choking of the pipes a screen or grating is provided through which the mud or spoil passes before it enters the outlet pipe."

This would, of course, break up the material and destroy any jet action. Furthermore, a grating could not be used with concrete, as it would cause the rocks to form *a complete dam,* if they ever got that far.

The Duckham patents

1. Are for handling *liquid in a column.*

2. Contain no suggestion that concrete or similar material can be handled in any manner by air pressure.

3. *Give no suggestion of a velocity nozzle located at the outlet of the chamber into the conveying conduit, for any purpose.*

4. Disclose a structure which differs greatly from that of McMichael, and could not be used for handling concrete at all.

5. Are old *foreign* patents without definite description of anything relating to the present invention, and are therefore irrelevant.

Permutit Co. v. *Harvey Laundry Co.* (C. C. A. 9th), 279 Fed. 713, 718,

citing,

Seymour v. *Osborne*, 11 Wall. 516, and other authorities.

Permutit Co. v. *Wadham* (C. C. A. 6th), 13 Fed. (2d) 454, 457.

The Smith U. S. patents of 1872 (Exbt. Bk., pp. 481 and 484) propose to use "a quantity of water equal to about *three-fifths* of the entire mass of materials" (R. 481, Col. 2), or at least 37½ per cent. of water, so that "a liquid or semi-liquid mass results which can be flowed through pipes" (*Id.*), and to then force this liquid through a discharge pipe by simple air pressure behind it. **No velocity nozzle or other nozzle located anywhere is suggested.**

These Smith patents

1. Would so dilute the cement in the concrete mixture as to render it worthless, since the maximum amount of liquid permissible is about 10 per cent. (R. 591); and Smith proposed to use *nearly four times* that amount.

2. Gave no hint or suggestion of the vital and indispensable nozzle at the outlet from the chamber into the conveying conduit, which has made the patented invention a success, where all prior devices were useless for conveying concrete or the like.

3. Merely show that thirty-five years before McMichael the desirability of conveying concrete by

compressed air was realized, and that at that early date it was proposed to ruin the concrete mixture in order to do it.

4. Were mere paper patents which never contributed anything to the public good.

5. Were for a liquid column apparatus not usable for concrete, which is at least 90 per cent. solids, and principally a mass of rocks.

The maker of the defendants' (Storrie) apparatus, Hackley, who knew all about the patented machines (R. 72, 91), after making a test with an alleged Smith apparatus and admitting that it failed to properly discharge the rock (R. 434) finally concedes that it is not satisfactory, **because it does not have the jet at the outlet,** and that he uses the jet at the outlet for the reason that it gives **"a different and better action"** (R. 435-6).

And this is the best that the biased witnesses could do, *in camera,* with the Smith machine, at the instance of the Pacific Gas & Electric Company, another alleged infringer of the patent in suit (R. 468-470).

It is obvious that the defendants are not using the Smith apparatus, but are using the apparatus of the patent in suit, and contesting this litigation, because the present apparatus is operative and perfectly efficient, whereas the Smith apparatus is worthless.

The Kolsche German patent of 1882 (Exbt. Bk. 182-b) is for nothing but a kinetic air flotation device for "conveying slack (coal dust) sandy or granular material by means of a current of air." The material is *dropped* from the bottom of the vessel *in a thin stream* into a large blast of air rushing through a large conduit, and is carried along in *suspension. It has no nozzle or anything of the sort* at or near the outlet of the chamber, or anywhere else, and could not be used for concrete or any similar material in any way.

It is an old foreign patent disclosing nothing relevant to the present invention.

The Goldie patent 707,840 of 1902 (Storrie Exbt. Bk. 514) is for nothing but a crude impracticable apparatus for blowing dry cement, or cement and sand, under railroad ties, by means of a jet of steam. The dry material must first *gravitate* from a hopper down through a long narrow pipe to the nozzle, and if the nozzle met with any resistance, it would blow up through the top of the hopper which is not sealed and has no air pressure in it.

The Goldie patents 576,128 and 9 (*Id.* 498 and 506) are crude predecessors of the later Goldie patent above mentioned, and are for substantially the same impossible scheme. In both of them, the dry material is contained *in an open hopper*, gravitates down into the small pipe and is supposed to be blown under the railroad ties by pressure supplied to this pipe by a small hand pump.

The Farnham patent 747,396 of 1903 (Ulen R. 347) shows only a "sand-blast" apparatus, for producing a blast of sand carried in a current of air, for cleaning and other purposes. This is fully discussed in our main brief at pages 53-55.

The Farnham patent shows:

1. No jet or nozzle at the outlet but a *suction* jet (11) *at the bottom of a long, narrow pipe* extending from the *flat* bottom of the vessel, and obstructing the mouth of that pipe so as to project air "across the mouth of the discharge-pipe 2" (Spec., p. 1, lines 100, *et seq.*).

2. No cooperation between the pressure in the tank and the suction jet or nozzle, since the sand flows "by gravity" (*Id.* line 18) in a small stream from the tank down to the point where it is acted upon by the suction and blast of the nozzle and blown through the small pipe leading to the work, suspended in the air.

3. No nozzle of any description at or near the outlet of the vessel.

4. And would have to be rearranged and redesigned to convey concrete or the like, *and with the teachings of the McMichael patent in suit in view.*

The Warren patent 671,303 (*Id.* 650) is for a "mixer for sand-blast apparatus," and shows a hopper with a small bottom discharge pipe through which materials (loose sand, etc.) pass in a small stream from the hopper to a chamber in a pipe through which a current of air passes, where it is caught up by the air, "with which it mingles and by which it is carried through the chamber into the flexible tube M and discharged through the nozzle O" (Spec., p. 1, lines 63-71). It shows nothing not shown in the Farnham patent. It does not even show a suction nozzle, nor a nozzle of any kind.

The Sickels and Butler patents 99,360 and 660,946 (Storrie, Exbt. Bk. 514 and 654) are even less relevant than the foregoing kinetic or air flotation patents.

The Canniff patent 873,345 and McIlvrid patent 958,421 (R. 318 and 323) are merely for machines which mix and discharge grout, a thin *liquid* composed of sand, cement and water, which is forced in a liquid column through pipes, like any other liquid. They also lack the nozzle at the outlet of the chamber (they have no nozzle at all) which is an indispensable element of the patent in suit.

The wholly uncorroborated oral testimony of Mr. McCormick to the effect that he used air in an apparatus like that of the Canniff patent to assist the discharge of the liquid grout (Storrie R. 403-420), nearly thirty years before he testified, based as it is upon pure unaided recollection, is unbelievable. The courts in the Ninth Circuit evidently gave it no credence. Furthermore, it has been sufficiently shown that the use of air at the outlet would break up the column of liquid (McCormick never used anything but grout) and make it ineffective for grouting.

McCormick's recollection as to date and the particular character of the apparatus used by him with his "paint-like grout" (*Id.* 415) has evidently been reconstructed with the exigencies of the present situation in view.

From the foregoing it will be seen that all the prior patents relied on by the defendants—except pump patents, which are entirely irrelevant—belong to one of two classes, viz.:

> **1. Patents for kinetic or air flotation devices for handling light or finely divisible materials by conveying them in suspension in a current of air, and**
>
> **2. Patents for apparatus for moving a column of liquid by means of air pressure behind it;**

And that neither of these could be used to convey concrete which is composed almost wholly of heavy cohesive solids intimately mixed and proportioned and the bulk of which is broken rock or stones; and further,

That McMichael's apparatus belongs to a third and new class, which has no precedent in any art, the characteristics of which are (1) a chamber in which solids are maintained under pressure forcing them to the contracted outlet of the chamber, and (2) a velocity nozzle at the outlet of the chamber to the conduit directed into the materials and into the outlet to shoot them through the outlet and through the conduit in a mass or masses to the point of application.

No pneumatic apparatus for conveying coarse, heavy solids was known before McMichael's invention.

III.

The invention of the patent is and always has been the same from the filing of the application in 1907 up to the present date.

The criticism based on the alleged enlargement of the invention has been overruled by the courts in the Second Circuit no less than four times, viz:

By the District Court and the Court of Appeals in the Ulen suit and by both courts again in this present suit. **It has no merit in fact or in law, and may be briefly answered by the following summary:**

1. The drawing of the patent is the drawing originally filed in the application; not a line nor a letter has been changed.

2. The original specification described that apparatus and its method of operation with ample clearness and detail to enable any one skilled in the art to make and use them fully, and, in all their advantages, which is all that the Patent Statute (U. S. R. S. 4888) requires.

3. The Patent Statute does not even require a full description in the application, but only in the patent as finally issued.

4. A patentee has the absolute right to amplify the description of his invention while his application is pending, so long as it is fairly based upon his original disclosure, in the drawings or in the specification, or both.

Westinghouse v. *Metropolitan* (C. C. A. 2nd), 290 Fed. 661;

Diamond Rubber Co. v. *Consolidated Tire Co.*, 220 U. S. 428, 435;

Cleveland Foundry Co. v. *Detroit* (C. C. A. 6th), 131 Fed. 853, 857;

Overland v. *Packard*, 274 U. S. 417; 71 L. Ed. 1131.

5. If the patentee wishes to depart from the original disclosure of his application, while his application is pending, he may do so, provided only that he files a supplemental oath to the effect that the invention was not published or used, etc., two years prior to his original application, and this merely to satisfy the Patent Office on that point, under Section 4892, of the Patent Statute. *This McMichael did* (Ulen R. 251; Storrie R. 273), *although it was not necessary*, because the additional claims and description were clearly based on the original disclosure.

6. Some of the claims in the patent are of substantially the same scope as claim 3 of the original application, and claim 3 of the application is *substantially identical* with claim 2 of the patent. (See original claim 2, Storrie R. 201, Ulen R. 202.) This claim is in both suits.

It is therefore apparent that the patent as issued is for the original invention, supported by the original and supplemental oath, and that the description and claims added during the pendency of the application are properly in the patent.

(See also discussion this subject, pp. 36-47. Respondent's Brief, and decisions quoted.)

IV.

No attempt has been made to alter the patent or change its meaning in any way since the patent was granted and became a public document.

The slug theory of operation is not, and never was, a part of the patent or any of its claims, but is an *explanation* of the astonishing fact that the invention makes it possible for a jet of air acting under the pressure behind the mass and located at the critical point, to shoot tons of rocks carefully mixed with sand, cement and a little water, at express speed, thousands of feet and up to high

elevations, without disturbing the mixture of these heterogeneous elements.

It was hard in the beginning to make engineers believe that this could be done (Ulen R. 44), and the plaintiff, therefore, thought that the court should be given its own best explanation of the reasons for this remarkable performance. This was appreciated by the District Judge, in the Second Circuit, in the *Ulen* case, who referred to it in his opinion (12 Fed. [2nd] 929), and whose decision was endorsed by the Court of Appeals (*Id.* 931).

The action is not kinetic or air flotation action, nor liquid column action, such as prior devices employed for finely divisible solids, such as sand, grain, etc., or liquids such as mud, cement (as grout), etc., carried in water.

Even the testimony for both defendants in these cases proves that. Their witnesses state that the concrete and air come out in "a solid stream" (Powers-Kennedy R. 22, Qs189-191), and although a considerable volume of air necessarily discharges with the concrete, there are no bubbles or entrained air mixed with the concrete (*Id.*).

This was also the finding of the court in the *Storrie* case based on the testimony of the defendants' witnesses (see Wilkins, Storrie R. 446). The court said (Storrie R. 618):

> "* * * that the concrete discharges in a continuous aerated or mixed stream of concrete and air and not at all in any slug formation."

(See also Opinion, 9th C. C. A., last page.)

The question, however, was not how the concrete was discharged at the distant outlet of the conveying conduit, but how it was charged from the chamber into the other end of the conduit.

The slug theory is adhered to, in spite of the fact that the courts in the Ninth Circuit have found against it, as the only satisfactory explanation, of how a mass of solids,

principally rocks, can be conveyed by compressed air through a pipe to distances up to approximately a mile, smoothly, without disintegration, and without the inevitable plugging of the pipe at every step and on each new discharge, which would otherwise be the ruinous result.

But, after all, the slug theory is merely a **theory,** and has nothing to do with the interpretation of the patent and its claims, which are not limited in any way or dependent upon the correctness of that theory.

Accordingly, the Court of Appeals in the Second Circuit, after the decision of the District Court in the Ninth Circuit, said (Powers-Kennedy R. 344):

> "* * * nobody before McMichael had used a pneumatic apparatus to transport concrete,"

and (*Id.* 346):

> "To us the dispute seems irrelevant. The patent says nothing which commits the patentee to the slug method of operation."

And again (*Id.* 347):

> "But whether the concrete goes forward as we imagine, or in some other manner, there is no sufficient reason to suppose that defendants' machine does not operate in the same manner as plaintiff's, whatever that manner may be."

The slug theory is therefore not an attempt to change the patent or read anything into it, but merely a satisfying *explanation* of its remarkable performance.

Nor is any theory of operation necessary to apply the claims to defendants' device, which has all the elements of these claims, and produces precisely the same result.

The courts in the Ninth Circuit have not found to the contrary, but, as we have seen, have without warrant *read*

into them the slug theory, and unimportant structural details, in order to find non-infringement.

(For further discussion of these questions see Respondent's Main Brief, pp. 97-101, and, on infringement, pp. 63-96.)

The "nose of wax" decision (*White* v. *Dunbar*, 119 U. S. 47) involved a *reissue* patent in which the language of the claims had actually been changed to change the nature of the original invention. It has no application here.

The Kirkland Article, written by a person who was not connected with the owners of the patent, but merely with a licensee at that time, is wholly irrelevant and incompetent, and was ignored by the court, after proper objection (Powers-Kennedy R. 104). The statement that Mr. Kirkland was then Chief Engineer for the patentee or was connected with the patentee, is erroneous (*Id.*).

This article was published more than three years after the patent was granted (*Id.* 103), and more than six years before the commencement of this suit. Furthermore, it was repudiated by the author, in this suit and the earlier Ulen suit, as incorrect, after actual tests (*Id.* 105-6). It is also shown to be erroneous by the statement of the patentee, made to the Patent Office through his attorney during the prosecution of the application (*Id.* 106, Ulen R. 267; Storrie Exbt. Bk. 296).

All that Kirkland's article could indicate, if it were admissible, is that the operation of the patented apparatus is so obscure and almost inexplicable that even an engineer familiar with the apparatus could misinterpret its internal *modus operandi*.

(For further discussion of this matter see Appellee's Main Brief, pp. 108-9.)

V.

The velocity nozzle at the outlet is and always has been the most vital element of the patented combination, and essential to the method of the patent.

It was shown in the drawings, described and claimed in the original application (see Spec. p. 1, lines 60-64, and p. 2, lines 21-24, which correspond with the original specification). To answer the unfounded contention of the defendants that the velocity nozzle has been introduced or magnified since the patent was granted, it is only necessary to quote briefly from the description in the specification, which says, *inter alia* (p. 2, lines 50, *et seq.*):

> "The lower pipe 10, however, serves to direct a jet of air moving at a considerable *velocity* directly against portions of the mass as they move toward and into the discharge duct. The two pipes thus act in very different ways, the upper pipe supplying air which acts by *pressure* and the lower pipe supplying air which acts by *velocity*."
>
> (See also p. 2, lines 21-50 and 68-93.)

It is also distinctly specified in the claims of which claim 2 serves as an illustration, saying

> "* * * and *another* compressed air inlet pipe leading through the chamber wall and terminating within the chamber near the opening into the conduit in a *nozzle directed toward said opening*."

And it was this velocity nozzle, located at and directed toward the outlet of the chamber into the conveying conduit which at once made the McMichael invention what it is and distinguished it both in genus and species from all previous devices.

It is not a suction nozzle, limited to a pressure of less than the atmospheric pressure of fifteen pounds, created

behind it, nor an agitating or stirring nozzle for loose or floatable materials, but a cutting, driving jet located at the critical point where the rocky concrete mass would jam, arch or plug, and acting by its velocity on the obstinate mass of solids to break the jam—or rather prevent it—and shoot these solids intact to great distances and great elevations.

For a further discussion of all of the foregoing matters, the court is referred to this respondents' main brief.

Respectfully submitted,

STEPHEN J. COX,
LYNN A. WILLIAMS,
Counsel for Respondents.

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TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1928 1930

No. 528

CONCRETE MIXING & CONVEYING COMPANY, PETITIONER,

vs.

R. C. STORRIE & COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

PETITION FOR CERTIORARI FILED NOVEMBER 5, 1928

CERTIORARI GRANTED DECEMBER 10, 1928

(33,837)

(33,837)

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1928

No. 528

CONCRETE MIXING & CONVEYING COMPANY, PETITIONER,

vs.

R. C. STORRIE & COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

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[1*]

In the District Court of the United States for the Western District of Washington, Northern Division.

IN EQUITY—No. 394.

CONCRETE MIXING AND CONVEYING COMPANY,

Plaintiff,

vs.

R. C. STORRIE & COMPANY, a Partnership,

Defendant.

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*Page-number appearing at the foot of page of original certified Transcript of Record.

PLACITA.

Pleas in the District Court of the United States for the Western District of Washington, Northern Division, begun and held at the United States courtroom in the City of Seattle, in said District and Division, before the Honorable George M. Bourquin, District Judge of the United States for the District of Montana, sitting by assignment in said District and Division, on the 13th day of September, in the year of our Lord one thousand nine hundred and twenty-seven, being one of the days of the regular May term of said court begun on Tuesday, the third day of May, 1927, and of our Independence the one hundred and fifty-second year. Present, Honorable George M. Bourquin.

E. B. BENN,
Marshal.
Ed. M. Lakin,
Clerk.

[Endorsed]: Filed Mar. 1, 1928. [2]

United States District Court, Western District of Washington.

IN EQUITY—No. 394.

CONCRETE MIXING AND CONVEYING COMPANY,

Plaintiff,

vs.

R. C. STORRIE & COMPANY, a Partnership,

Defendants.

BILL OF COMPLAINT.

Plaintiff, for complaint against defendants, alleges as follows:

(1) Plaintiff, Concrete Mixing and Conveying Company, is a corporation organized and existing under and by virtue of the laws of the State of Illinois, having its principal place of business at Chicago, in the County of Cook and State of Illinois. Defendants, Robert C. Storrie and Robert G. Muir, are partners doing business as R. C. Storrie & Company, and have a regular and established place of business at Seattle, in the County of King and State of Washington, within the Western District of Washington, within which district they have committed acts of infringement of plaintiff's patent, of which complaint is made herein.

(2) John H. McMichael being, prior to January 14, 1907, the original, first and sole inventor of certain new and useful improvements in method of and

apparatus for transporting and treating concrete, lawfully filed and prosecuted an application for United States letters patent therefor, and having complied in all respects with the statutes, and having duly assigned said invention and application to plaintiff by mesne assignments, United States patent No. 1,127,660 was lawfully granted and issued [3] pursuant to said application to plaintiff on February 9, 1915.

Said invention of John H. McMichael was new and useful, not known or used by others in this country before his invention thereof, not patented or described in any printed publication anywhere before his invention or more than two years prior to said application for United States patent therefor, not in public use on sale in the United States for more than two years prior to said application for United States letters patent therefor, not patented in any foreign country by him or his legal representatives on an application filed more than one year before his said application for United States letters patent, and not abandoned. Said United States letters patent No. 1,127,660 is now in full force and is hereby proffered and ready to be produced before the court.

(3) The invention patented in the aforesaid patent No. 1,127,660 is of great utility and has been introduced into public use by the plaintiff, and the public generally has acquiesced in and acknowledged the utility of said invention, and the validity of said letters patent, and the plaintiff's exclusive rights thereunder.

(4) Plaintiff is and always has been the sole owner of said United States letters patent No. 1,127,660 and of all rights of action for infringement thereof.

(5) Plaintiff alleges that defendants have heretofore recognized the validity of said patent and plaintiff's exclusive rights thereunder, and are estopped to deny the validity of said patent, by reason of the following facts:

On or about March 15, 1916, Pacific Concrete Placing Company, a firm of San Francisco, California, was licensed by plaintiff, to use the invention of said patent in the State of [4] California and, under certain conditions, was empowered by plaintiff to grant sublicenses to use the invention of said patent in the State of California, but not elsewhere. Prior to March 15, 1916, defendants unlawfully and wrongfully constructed two machines embodying the invention of said patent and were using or preparing to use said machines in the construction of the so-called "Twin Peaks Tunnel" located in the City and County of San Francisco, California. Defendants, being advised that said machines were infringements of said patents, on or about March 15, 1916, entered into a written contract with said Pacific Concrete Placing Company. By said contract defendants recognized the validity of said patent and plaintiff's ownership thereof, and secured the right and license to use said two machines in connection with said "Twin Peaks Tunnel" but not otherwise. In said contract defendants agreed, *inter alia,* that they would not, without the written

consent of the Pacific Concrete Placing Company (and said consent never was given), use said machines, or either of them, upon any other work than said Twin Peaks Tunnel, and defendants further agreed that, upon the completion of the work at the said Twin Peaks Tunnel, said machines were to become the property of Pacific Concrete Placing Company and were to be delivered by defendants to Pacific Concrete Placing Company. Said contract is still in force and effect. All of the obligations of plaintiff and Pacific Concrete Placing Company, under said contract, have been performed but said contract is executory on the part of defendants. Defendants still retain possession of said machines.

(6) In violation of plaintiff's rights under said patent No. 1,127,660, and without any authority, within six years prior to the amendment of this suit, within the Western District of [5] Washington, and elsewhere in the United States, defendants have infringed plaintiff's exclusive rights granted by said patent, and more particularly have infringed Claims 1, 2, 17, 18, 20, 22, 23, 24, 25, 27, 28, 29, 30, 34, and 35 thereof, as follows, to wit:

(a) By making and (or) using and (or) selling apparatus embodying said patented invention.

(b) By using one or both of the machines mentioned in paragraph 5 hereof in the construction of a tunnel forming part of the so-called "Skagit River Project" located near Rockport, State of Washington.

(c) By using at said tunnel forming part of said Skagit River project other machines embodying said patented invention.

Defendants continue to make, use and sell infringing machines in violation of plaintiff's rights, and in infringement of said patent, whereby plaintiff has been, and is being, greatly and irreparably damaged and whereby defendants have obtained, and are obtaining, large profits which in equity belong to plaintiff, the amount of which damage and profits cannot be ascertained except by an accounting.

Plaintiff, therefore, prays:

(a) That defendants be required to answer this bill of complaint, but not under oath, answer under oath being hereby expressly waived.

(b) That the Court grant a preliminary injunction pending this suit and a perpetual injunction restraining defendants, their agents, employees and confederates from making, using or vending devices embodying said patented invention, and from offering or advertising so to do, and from aiding or abetting or in any way contributing to the infringement of said patent. [6]

(c) That this cause be referred to a Master to make and report an account of damages and profits accruing from defendant's infringement of said patent, and that plaintiff have judgment for the damages and profits so found and for the costs of this suit.

(d) That plaintiff have such other and further relief as equity may require.

CONCRETE MIXING AND CONVEYING COMPANY,

By EDWARD WRAY,
President.

BATTLE, HULBERT,
GATES & HELSELL,
901 Alaska Bldg., Seattle,
LYON A. WILLIAMS,
ALBERT G. M. WEBB,
Of Counsel.

State of Illinois,
County of Cook,—ss.

On January 23d, 1924, at Chicago, Illinois, before me personally appeared Edward Wray, who being first duly sworn, testified that he is the President of Concrete Mixing and Conveying Company, the plaintiff named in the foregoing bill of complaint; that he signed the same as such officer; and that he has read the bill of complaint and believes the allegations thereof to be true.

[Seal] (Sgd.) J. DAVID DICKMAN,
Notary Public. [7]

[Title of Court and Cause.]

MOTION TO STRIKE.

Now come the defendants and move the Court to strike out paragraph 5 of the bill of complaint:

(1) Because said paragraph alleges matter irrelevant and impertinent to the issues of the bill, in that it sets out the terms of a license agreement, pleading conclusions of law that the same license agreement is now in force and effect and thereby rendering uncertain the issue of the bill of complaint, which otherwise is drawn as a bill for infringement of a patent; and

(2) Because said paragraph 5 does not set forth ultimate facts:

WHEREFORE, defendants pray for an order from the Court striking said paragraph.

CHADWICK, McMICKEN, RAMSEY & RUPP,

By G. WRIGHT ARNOLD.

G. WRIGHT ARNOLD,

Solicitors for Defendants.

Service of within motion to strike and receipt of copy admitted this 18th day of April, 1924.

WILLIAMS, BRADBURY, McCALEB & PIERCE and

BATTLE, HULBERT, GATES & HELSELL,

Attorneys for Plaintiff.

Filed Apr. 18, 1924. [8]

[Title of Court and Cause.]

ORDER GRANTING MOTION TO STRIKE.

This cause coming on for hearing upon the motion of the defendant to strike from the bill of com-

plaint on file herein paragraph five thereof, plaintiff appearing by Messrs. Battle, Hulbert, Gates & Helsell, its attorneys, and defendant appearing by Mr. G. Wright Arnold, its attorney, and the cause having been argued and submitted to the Court—

NOW, THEREFORE, IT IS ORDERED that said motion to strike paragraph five be, and the same is, hereby granted.

To the entry of the foregoing order the plaintiff excepts and its exception is duly allowed.

Done in open court this 23 day of May, 1924.

JEREMIAH NETERER,
Judge.

O. K. as to form.

G. WRIGHT ARNOLD.

Filed May 23, 1924. [9]

[Title of Court and Cause.]

ANSWER.

To the Honorable Judge of the District Court of the United States for the Western District of Washington, Northern Division.

In answer to the bill of complaint defendant says:

I.

That they are not informed, save by the said bill of complaint, whether the plaintiff is a corporation organized and existing under and by virtue of the laws of the State of Illinois having its principal place of business at Chicago, County of Cook, State of Illinois, and therefore deny the same.

II.

Deny upon information and belief that they have at any time committed, or are committing, any infringement upon any letters patent of plaintiff within said Western District of Washington or elsewhere.

III.

Deny upon information and belief that prior to January 14, 1907, or at any time, John H. McMichael was an original or first or sole inventor of any new or useful improvements in Method of and Apparatus for Transporting and Treating Concrete. Defendant admits that letters patent of the United States No. 1,127,660 were issued February 9, 1915, upon an application of the said [10] McMichael, but whether said patent was duly applied for or granted according to law, defendant is not informed save by said bill, and, therefore, denies that there was secured to the said John H. McMichael or to his heirs at law any exclusive right to make, use and vend the alleged invention known as improvements in Method of and Apparatus for Transporting and Treating Concrete throughout the United States and the territories thereof. Defendant further answering denies that the said bill of complaint sets forth with that degree of particularity required by the provisions of sections 4886 and 4887 of the Revised Statutes of the United States, that patent No. 1,127,660 is good or valid or that all of the requirements of the Statutes have been complied with in securing the issuance of said patent; denies that said patent No. 1,127,660 is good

or valid in law, denies that the alleged invention thereof was novel or required invention for its production, denies that it contained patentable novelty, denies that it was not known or used by others in this country before the alleged invention or discovery thereof by the said McMichael, denies that it was not patented or described in any printed publication in this or any foreign country before his alleged invention or discovery thereof, or more than two years before his application for patent therefor, denies that it was not in public use or on sale in this country for more than two years prior to his said application, denies that it was not patented by him or his legal representatives in any foreign country on an application filed by him or them more than twelve months prior to the filing of said application in this country, and denies that said alleged invention had not been abandoned by him.

IV.

Denies each and every allegation in paragraph 3. [11] Defendant is not informed, save by said bill of complaint, whether the plaintiff is and always has been the sole owner of said United States letters patent No. 1,127,660 and of all rights of action for infringement thereof, and therefore denies the same.

V.

Denies each and every allegation in paragraph 6, provided further nothing in this answering paragraph contained shall be construed as admitting directly or indirectly for any purpose or purposes whatsoever the existence of paragraph 5 of the bill

of complaint of the plaintiff, which paragraph 5 has heretofore been stricken as per order of record, and particularly denies that defendant continues to make, use and sell infringing machines in violation of plaintiff's rights and infringement of said patent No. 1,127,660, and denies that plaintiff has been, and is being, greatly and irreparably damaged, and denies that defendant is obtaining and has obtained large profits which inequity belong to plaintiff, the amount of which damage and profits cannot be ascertained except by accounting, provided further nothing in this answering paragraph contained shall be construed as admitting directly or indirectly for any purpose or purposes whatsoever the existence of paragraph 5 of the bill of complaint of the plaintiff, which paragraph 5 has heretofore been stricken as per order of record.

And by way of a FIRST AFFIRMATIVE DEFENSE, defendant avers:

I.

That said patent No. 1,127,660 and particularly claims 1, 2, 17, 18, 20, 22, 23, 24, 25, 27, 28, 29, 30, 34 and 35 thereof, which claims alone are alleged to be infringed in said bill of complaint, are null and void, because the said John H. [12] McMichael is not the original, first or true inventor of the device described and claimed therein, but that the same and all substantial and material parts thereof were long prior to the supposed and alleged invention thereof by the said McMichael, described and/or patented, and/or illustrated in and by the following mentioned prior letters patent:

	Patent No.	Date.	Inventor.
	285,047	Sept. 18, 1883	J. Lewis
	65,149	May 28, 1867	S. W. Wood
	347,196	Aug. 10, 1886	G. Pohle
	599,055	Feb. 15, 1898	S. C. Davidson
	268,305	Nov. 28, 1882	L. L. Smith
	759,750	May 10, 1904	G. Rosenthal
	837,622	Dec. 4, 1906	J. D. James
	267,318	Nov. 14, 1882	J. W. Beach
	279,034	June 5, 1883	L. Smith
	408,201	July 30, 1889	J. S. Wallace
	894,813	Aug. 4, 1908	J. W. Buzzell et al.
	951,754	Mar. 8, 1910	J. W. Buzzell et al.
	179,055	June 20, 1876	F. C. Prindle
	837,113	Nov. 27, 1906	E. Phillips
Brit.	23,594	Oct. 23, 1896	Bothner
"	12,758	June 30, 1894	Trewent
Germ.	18,394		L. Kolsche
	873,345	Dec. 10, 1907	W. L. Canniff
	747,396	Dec. 22, 1903	Neal Farnham
	727,030	May 5, 1903	B. C. Tilghman, Jr.
	609,744	Aug. 23, 1898	C. T. Hennig
	773,665	Nov. 1, 1904	J. D. Murray
	818,776	Apr. 24, 1906	J. D. Murray
[13]			
	730,884	June 16, 1903	L. K. Davis
	864,471	Aug. 27 1907	W. H. Kelly
	531,379	Dec. 25, 1894	J. E. Mathewson
	519,599	May 8, 1894	C. Bloemendal
	276,879	May 1, 1883	M. Randolph
	602,349	Apr. 12, 1898	W. A. McCool
	741,116	Oct. 13, 1903	M. A. DeFrance

Patent No.	Date.	Inventor.
671,303	Apr. 2, 1901	A. G. Warren
791,176	May 30, 1905	F. W. Breidster
274,778	Mar. 27, 1883	J. B. Hyde
327,210	Sept. 29, 1885	W. Westlake
752,598	Feb. 16, 1904	G. M. Schwend
847,270	Mar. 12, 1907	F. M. Wise
758,118	Apr. 26, 1904	F. Sticker
632,147	Aug. 29, 1899	C. S. Robinson

and in various other patents and publications at the present time unknown to defendant but which defendant prays leave to add by way of amendment to this answer as soon as discovered. The above-named patents and any others which may hereafter be found defendant craves leave to produce and exhibit to the Court at any hearing of this case, and desires the same to be considered as annexed to and deemed a part of this answer.

By way of a SECOND AFFIRMATIVE DEFENSE, defendant avers:

II.

That in the state of the art which existed at the time said patent No. 1,127,660 was applied for, it did not require invention to produce the device and method described and claimed in said patent. Defendant further avers that said claims of said patent are narrowed, restricted and limited by reason of admissions of the said McMichael and of his attorney during the prosecution [14] of the application thereof in the Patent Office; that broader claims originally made in said application were re-

jected and that said rejections were acquiesced in by said McMichael, and such broader claims were erased and narrower and more limited and restricted claims inserted, whereby said plaintiff is estopped to ask for any broad construction of the said claims and has abandoned to the public any alleged broad invention originally claimed, and said patent if valid is limited in its scope to every particular detail of construction shown, described and claimed therein, as will appear in the certified copy of the file wrapper and contents, which defendant craves leave to produce and exhibit to the court at any hearing of this case, and desires the same to be considered as annexed to and deemed a part of this answer.

And by way of a THIRD AFFIRMATIVE DEFENSE, defendant avers:

III.

That said patent No. 1,127,660 does not set forth an operative device for constructing a water pressure tunnel, which type of tunnel defendant is constructing and is known as the "Skagit River Project."

And by way of a FOURTH AFFIRMATIVE DEFENSE, defendant avers:

IV.

That said John H. McMichael named in the bill of complaint was not the original, first and/or true inventor of the whole or any substantial part of the things described in the said claims alleged to be infringed of the patent in suit, but that the same of

all substantial parts thereof were old in the art and were commonly known to the public and made, sold and [15] used in the United States long prior to the respective alleged invention of the said McMichael, and were also so known and so used more than two years prior to his application for patent, and were so known to and used by the Ransome Concrete Machinery Company of Dunellen, New Jersey, in 1905.

All of these matters and things defendant is ready and willing to aver, maintain and prove as this Honorable Court may direct, and humbly prays to be hence dismissed with its costs and charges in this behalf most wrongfully sustained.

R. C. STORRIE & COMPANY,
Defendant.

CHADWICK, McMICKEN, RAMSEY & RUPP,
G. WRIGHT ARNOLD,
Solicitors for Defendants.

Service of the within answer and receipt of copy admitted this 28th day of May, 1924.

BATTLE, HULBERT, GATES & HELSELL,
Attorneys for Plaintiff.

Filed May 28, 1924. [16]

[Title of Court and Cause.]

AMENDMENT TO ANSWER.

Come now the defendants above named, by their counsel, and by leave of Court first had and obtained, amend their answer as follows:

Paragraph I of First Affirmative Defense, page 5 of the answer, after "632,147, Aug. 29, 1899, C. S. Robinson," add the following additional patents, publications, prior uses and prior inventions:

Patent No.	Date.	Inventor.
	Jan. 6, 1809	Upham
7,060	Jan. 29, 1850	Potts
45,153	Nov. 22, 1864	Gunning
47,793	May 23, 1865	Brear
80,225	July 21, 1868	Robertson
86,289	Jan. 26, 1869	Duvall
92,985	July 27, 1869	McKinley
99,360	Feb. 1, 1870	Sickels
4,953	June 18, 1872	Sickles (Reissue)
122,498	Jan. 2, 1872	Smith

[17]

140,692	July 8, 1873	Faucett
146,357	Jan. 13, 1874	Prall
147,780	Feb. 24, 1874	Milner
167,384	Sept. 7, 1875	Boeklen
185,216	Dec. 12, 1876	Cranston
204,725	June 11, 1878	Gunning
220,293	Oct. 7, 1879	Knapp
224,197	Feb. 3, 1880	Maguire et al.
233,499	Oct. 19, 1880	Frizell

Patent No.	Date.	Inventor.
240,265	April 19, 1881	Palmer
250,602	Dec. 6, 1881	Thiollier et al.
267,318	Nov. 14, 1882	Beach
273,623	March 6, 1883	Smith
274,103	March 20, 1883	Ayres
274,104	March 20, 1883	Ayres
277,177	May 8, 1883	Von Schmidt
298,990	May 20, 1884	Leedy
300,333	June 10, 1884	Von Schmidt
318,859	May 26, 1885	Bowers
327,307	Sept. 29, 1885	Peters
327,308	Sept. 29, 1885	Peters
338,138	March 16, 1886	Buell
355,251	Dec. 28, 1886	Bowers
371,006	Oct. 4, 1887	Waits
416,180	Dec. 3, 1889	Neukirch
425,624	Apr. 15, 1890	O'Neil
435,142	Aug. 26, 1890	Harris
450,062	April 7, 1891	Estes
461,429	Oct. 20, 1891	Frasch
461,430	Oct. 20, 1891	Frasch
461,431	Oct. 20, 1891	Frasch
[18]		
464,771	Dec. 8, 1891	Harris
468,365	Feb. 9, 1892	Robbins
472,072	April 5, 1892	Patterson
487,606	Dec. 6, 1892	Church
487,639	Dec. 6, 1892	Pohle
491,843	Feb. 14, 1893	Kauser
495,359	April 11, 1893	McClave
497,427	May 16, 1893	Hussey & Harsen

Patent No.	Date.	Inventor.
501,215	July 11, 1893	Schubert
521,883	June 26, 1894	Holland
523,838	July 31, 1894	Hussey
526,529	Sept. 25, 1894	Hussey
526,530	Sept. 25, 1894	Hussey
526,531	Sept. 25, 1894	Hussey
526,652	Sept. 25, 1894	Hussey
528,449	Oct. 30, 1894	Staley
542,620	July 16, 1895	Bacon
542,622	July 16, 1895	Bacon
555,704	March 3, 1986	Hussey
555,785	March 3, 1896	Misic & Foster
568,445	Sept. 29, 1896	Kennedy
568,742	Oct. 6, 1896	Church
577,522	Feb. 23, 1897	Wallwork & Wells
587,126	July 27, 1897	McAdams
592,037	Oct. 19, 1897	Young & Shaw
593,013	Nov. 2, 1897	Fisher
593,151	Nov. 2, 1897	Zohe
597,023	Jan. 11, 1898	Saunders
600,703	March 15, 1898	Andrews
601,521	March 29, 1898	Melcher
[19]		
11,675	June 28, 1898	Titus (Reissue)
609,350	Aug. 16, 1898	Jones
619,727	Feb. 21, 1899	Davis
620,414	Feb. 28, 1899	Burger
635,270	Oct. 17, 1899	Rix & Donahoo
636,279	Nov. 7, 1899	Newhouse
646,640	April 3, 1900	Evans
656,994	Aug. 28, 1900	Munn

Patent No.	Date.	Inventor.
660,946	Oct. 30, 1900	Butler
669,192	Mar. 5, 1901	Whisler
669,409	Mar. 5, 1901	Dunn
674,021	May 14, 1901	See
676,128	June 11, 1901	Goldie
676,129	June 11, 1901	Goldie
704,608	July 15, 1902	Young & Shaw
707,840	Aug. 26, 1902	Goldie
715,548	Dec. 9, 1902	Cary
734,773	July 28, 1903	Stuart
738,326	Sept. 8, 1903	Higgins
749,206	Jan. 12, 1904	Limbert
749,488	Jan. 12, 1904	King
758,360	Apr. 26, 1904	Harris
759,100	May 3, 1904	Harris
759,357	May 10, 1904	Edison
759,706	May 10, 1904	Harris
778,878	Jan. 3, 1905	Moir
799,642	Sept. 19, 1905	Frasch
800,127	Sept. 19, 1905	Frasch
810,989	Jan. 30, 1906	Steinert
814,601	March 6, 1906	Harris

[20]

870,620	Nov. 12, 1907	Frasch
958,421	May 17, 1910 (application filed Nov. 2, 1905)	McIlvrid
977,444	Dec. 6, 1910 (application filed October 30, 1903)	Frasch

Patent No.	Date.	Inventor.
988,995	April 11, 1911 (application filed October 30, 1903)	Frasch
Brit. 2,539	1868	Crampton
" 4,400	Dec. 18, 1875	Duckham
" 4,277	1882	
" 8,451	Oct. 13, 1884	Gordon
" 15,348	Dec. 14, 1885	Duckham
" 5,221	1886	Greathead
" 11,346	Aug. 8, 1888	Neukirch
French 5,707	Dec. 8, 1838	Triger
" 322,237	June 19, 1902	Societe des Etablissements S. Grauer & Cie.
German 37,503	Sept. 29, 1885	Poetsch
" 42,513	Feb. 17, 1887	Jeziorsky
" 46,842	July 24, 1888	Neukirch
" 25,355		

PUBLICATIONS.

The Pohlé Air Lift Pump—1893—Catalog—New York.

The Pohlé Air Lift Pump—1894 Catalog—New York.

Engineering & Mining Journal, Dec. 28, 1898 (pages 271 to 278, inclusive), Article by C. A. Stetefeldt.

"Engineering News," July 12, 1894 (pp. 260 to 264, inclusive), Article by L. B. Merriam.

Rockford, Illinois "Star," October 14, 1893. [21]

"The Democrat," Bambridge, Georgia, Feb. 15, 1894.

Joliet, Illinois, "Daily Republican," March 15, 1894.

Ashbury Park "Journal," April 20, 1894.

"Pumping by the Air Lift Method" (3rd Pohle Catalog) (Press of Moss Engraving Co.).

"Air Lift Pumping," by Edward A. Rix, San Francisco, March 1, 1904.

"Petroleum—A History of the Oil Region of Venango County, Pennsylvania," by Rev. S. J. M. Eaton, Philadephia, J. P. Skelly & Co., 732 Chestnut St., 1866 (pages 136 and 137).

Rogers "Pumps and Hydraulics," 1905—Published by Theo. Audel & Company, New York and London (pages 79 to 90, inclusive).

"Compressed Air Information or Cyclopedia Containing Practical Papers on the Production, Transmission and Use of Compressed Air," Edited by W. L. Sanders, published by "Compressed Air," 26 Cortlandt St., New York—Copyright 1903, by "Compressed Air," and particularly pages 81, 181, 182, 183, 249, 250, 343, 594 to 599, inclusive, 602, 603, 656, 657, 663, 664, 665, 691, 829, 830, 847 to 862, inclusive, 1017, 1018 to 1032, 1040 to 1050, inclusive, 1144 and 1145.

"Compressed Air, Its Production, Uses and Applications," by Gardner D. Hiscox, Fourth Edition, published by Norman W. Henley & Co., 132 Nassau St., New York, 1903, "Copyright, 1901, by Norman W. Henley & Co." (Chapter XXXII, and particularly pages 711 to 729).

"Journal of the Franklin Institute," Volume 140 of 1895 (pp. 46 and 47).

"Harper's Weekly," Issue of January 28, 1893 (pp. 89 and 90).

Catolog No. 73 of the Intersoll-Sergeant Drill Co., First Edition, 1905, entitled "Water Lifted by Compressed Air."

"Compressed Air," Vol. II, New York, June, 1897, No. 4 (p. 234).

"Compressed Air," Vol. II, New York, Sept., 1897, No. 7 (page 295).

"Compressed Air," Vol. III, New York, March, 1898, No. 1 (page 403).

"Compressed Air," Vol. III, New York, April 1898, No. 2 (page 420).

"Compressed Air," Vol. VIII, New York, April 1903, No. 2 (pages 223, 230 and 231). [22]

"Compressed Air," Vol. VIII, New York, January 1904, No. 11 (pp. 2723 to 2735, inclusive).

"Dredging Operations and Appliances"—Proceedings of the Institution of Civil Engineers, March 1, 1887, London, re Duckham's Pneumatic Dredger.

"Baker's Treatise on Masonry Construction"—Wiley & Sons (1899), (particularly pages 272 and 291).

"I Knight's Mechanical Dictionary" (pp. 28, 29, 30, 49, 420–422, inclusive).

"The Engineering Record," Vol. 54, Oct. 20, 1906 (pp. 424 to 427, inclusive).

"Railroad Gazette, A Journal of Transportation, Engineering and Railroad News," April 20, 1906, Vol. 40, No. 16 (pp. 404 to 406, inclusive).

"Engineering News," Oct. 19, 1905, Vol. LIV, No. 16 (pp. 407 to 409, inclusive).

"Transactions of the American Society of Civil Engineers," July 1879, Vol. 8 (pp. 186 to 188, inclusive).

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Minutes of the Proceedings of the Institution of Civil Engineers, 1887, Paper No. 2157, Vol. LXXXIX (pp. 2 to 32, inclusive).

Minutes of the Proceedings of the Institution of Civil Engineers, 1896, Paper No. 2784, Vol. CXXV (p. 303).

Minutes of the Proceedings of the Institution of Civil Engineers, 1896, Paper No. 2784, Vol. CXXV (p. 386).

Transactions of the Institution of Naval Architects, 1898, Vol. XL (pp. 127 to 131, inclusive, and plates XXX and XXXI).

"Compressed Air," Jan. 1902, Vol. 6, No. 11 (pp. 1655 to 1659, inclusive).

"Compressed Air," August 1902, Vol. 7, No. 6 (pp. 1941 to 1943, inclusive). [23]

"Compressed Air," March 1903, Vol. 8, No. 6 (pp. 2515 and 2516).

"Compressed Air," September 1903, Vol. 8, No. 7 (pp. 2566 and 2567).

"Compressed Air," October 1903, Vol. 8, No. 8 (pp. 2594 to 2598, inclusive).

"Compressed Air," May 1904, Vol. 9, No. 3 (pp. 2911 to 2922, inclusive).

"Compressed Air," June 1904, Vol. 9, No. 4 (pp. 2975 and 2976).

"Compressed Air," January 1905, Vol. 9, No. 8 (p. 3320).

"Compressed Air," February 1905, Vol. 9, No. 12 (pp. 3347 to 3355, inclusive).

"Compressed Air," December 1905, Vol. 10, No. 10 (pp. 3792 to 3795, inclusive).

"Compressed Air," February 1906, Vol. 10, No. 12 (p. 3897).

"Compressed Air," September 1903, Vol. 8, No. 7 (p. 3572).

"Compressed Air," April 1903, Vol. 8, No. 2, (pp. 2330 and 2331).

"Compressed Air," June 1896, Vol. 1, No. 4 (p. 3).

Book by George Frederick Zimmer, "The Mechanical Handling of Material,—being a treatise on the handling of material such as gold, ore, timber, and seed by automatic or semi-automatic machinery," published by D. Van Nostrand Co., New York, 1905 (pp. 107 to 116, inclusive).

"Engineering News," October 11, 1906, Vol. LVI, No. 15 (pp. 374 and 375).

"Revue Generale des Chemins de Fer et des Tramways," Vol. XXIX, No. 1 (pp. 529 to 539, inclusive) (1906).

"Centralblatt der Bauverwaltung," Feb. 21, 1891, XI year, No. 8 (pp. 73 to 75); No. 9, February 28, 1891 (pp. 84 and 85). [24]

"Zeitschrift des Vereines Deutscher Ingenieure," Dec. 7, 1901, Vol. XXXXV, No. 49 (pp. 1756 and 1757).

"Zentrallblatt der Bauverwaltung," Oct. 17, 1903, No. XXLLL year, No. 83 (pp. 517 and 518, with illustrations 1 and 2 on p. 516).

"Le Genie Civil," March 19, 1904, Vol. XLIV, No. 20 (pp. 314 to 317, inclusive).

"Zeitschrift des Vereines Deutscher Ingenieure," July 16, 1904, Vol. 48, No. 29 (pp. 1080 and 1081).

"Le Genie Civil," Dec. 29, 1900, Vol. XXXVIII, No. 9 (p. 145).

"Le Genie Civil," Sept. 21, 1895, Vol. XXVII, No. 21 (pp. 327 to 329, inclusive).

"Tunnel Shields," by William Charles Cowperthwait, 1905 (Fig. 56, pp. 94 and 95).

Eighth Annual Report of the Boston Transit Commission.

"Engineering News," January 25, 1902 (pp. 74, 75 and 76).

Cockburn Barrow Machine Co. "Catalogue C," Jersey City, N. J., U. S. A. (particularly p. 100).

"Engineering News," January 9, 1902, Vol. XLVII, Part 2 (pp. 35 and 36).

"Engineering News," February 6, 1902, Vol. XLVII, No. 6 (p. 113).

"Transactions of the American Society of Civil Engineers," Vol. XXIX, Sept. 1893 (pp. 639 to 643, inclusive, together with Plate No. 1, illustrative of the article).

"Transactions of the American Society of Civil Engineers," Vol. XXX, December 1893 (pp. 579 to 583, inclusive).

"Engineering Record," March 12, 1904 (pp. 329, 330 and 331).

"Engineering Record," Mar. 4, 1905 (pp. 232 to 235, inclusive).

"Engineering News," Mar. 7, 1891, Vol. XXV, No. 10 (pp. 200 and 221). [25]

"Engineering News," Sept. 12, 1895, Vol. XXXIV, No. 11 (p. 163).

"Le Genie Civil," Sept. 21, 1895, Vol. XXVII, No. 21 (p. 327).

"Le Genie Civil," Dec. 29, 1900, Vol. XXXVIII, No. 9 (p. 145).

"Construction Capacity and Cost of Operating Dredging Machines of Several Types in Recent Excavations of Large Magnitude," by John Bogart, being communication 3 in Section 2 of the I. X. International Navigation Congress, 1902 (pp. 10 and 11 and also title page).

"Engineering News," June 13, 1895 (Illustration appearing opposite page 378 and also pp. 379 and 380).

"Engineering News," June 13, 1895 (pp. 384, 385, 386 and 387).

"Engineering Record," Jan. 6, 1900 (pp. 2, 3 and 4).

"Transactions of the American Society of Civil Engineers," Vol. XXXI, January 1894 (pp. 70 and 71).

"Transactions of the American Society of Civil Engineers," Vol. XXXI, May 1894 (pp. 492 and 493).

Paragraph I of the Fourth Affirmative Defense, page 7 of the Answer, after "Ransome Concrete Machinery Company of Dunellen, New Jersey, in 1905," and the following:

Name.	Residence.	Place of Use.
Edward A. Rix,	San Francisco, Calif.,	At San Francisco, Red Bluff Oroville and Tulare, all in California, and elsewhere in the United States.
Austin Rix,	San Francisco, Calif.,	At San Francisco, Red Bluff Oroville and Tulare, all in California, and elsewhere in the United States.
[26] A. C. Dennis,	San Francisco, Calif.	At Pittsburgh, Pa., Memphis, Tenn., Cincinnati, Ohio, and elsewhere in the United States.
Ohio Connecting Railroad,	Pittsburgh, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.
Pennsylvania Railroad,	Pittsburgh, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.

Name.	Residence.	Place of Use.
Thos. W. Rodd,	Pittsburgh, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.
Drake Strattor Co.,	Philadelphia, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.
Wm. Fowler,	Chicago, Ill.,	At Pittsburgh, Pa., Chicago, Ill., and elsewhere in the United States.
Ingersoll-Sergeant Drill Co.,	New York City, New York,	At New York City, New York, and elsewhere in the United States.
W. L. Saunders,	New York City, New York,	At New York City, New York, and elsewhere in the United States.
Maryland Steel Co.,	Sparrows Point, Maryland,	At Sparrows Point, Md., and elsewhere in the United States.
Union Sulphur Co.,	Sulphur, La.,	At Sulphur, La., and elsewhere in the United States.

Name.	Residence.	Place of Use.
Wm. R. Keever,	Sulphur, La.,	At Sulphur, La., Crowley, La., and elsewhere in the United States.
Samuel W. Maxwell,	Sulphur, La.,	At Sulphur, La., and elsewhere in the United States.
John L. Henning,	Beaumont, Texas,	At Sulphur, La., and elsewhere in the United States.
Edmund M. Ivens,	New Orleans,	At Sulphur, La., and elsewhere in the United States.
W. M. Duson,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
[27]		
Myron Abbott,	Maringouin, La.,	At Crowley, La., and elsewhere in the United States.
Elmo G. Harris,	Rolla, Missouri,	At Rolla, Missouri, Sulphur, La., Crowley, La., and elsewhere in the United States.

Name.	Residence.	Place of Use.
Thos. S. Leake,	Chicago, Ill.,	At New Orleans, La., and elsewhere in the United States.
C. E. Akeley,	Chicago, Ill.,	At Chicago, Ill., and elsewhere in the United States.
J. W. Buzzell,	Boston, Mass.,	At Boston, Mass., East Orange, New Jersey, and elsewhere in the United States.
Illinois-Central Railroad Co.,	Chicago, Ill.,	At Chicago, Ill., New Orleans, La., and elsewhere in the United States.
W. H. Larkin, Jr.,	New Haven, Conn.	At Laporte, Indiana, and elsewhere in the United States.
Cockburn Barrow & Machine Company,	Jersey City, New Jersey,	At Jersey City, New Jersey; New York City, New York; and elsewhere in the United States.
Thos. Rodd,	Santa Monica, Calif.	At Pittsburgh, Pa., Memphis, Tenn., Cincinati, Ohio, and elsewhere in the United States.

Name.	Residence.	Place of Use.
R. A. Shailer,	New York City, New York.	At New York City, New York, Boston, Mass., and elsewhere in the United States.
Geo. Pegram,	New York City, New York.	At Boston, Mass., St. Louis, Mo., and elsewhere in the United States.
W. C. Merriman,	New York City, New York.	At Boston, Mass., St. Louis, Mo., and elsewhere in the United States.
Fred Neubauer,	New York City, New York.	At Boston, Mass., St. Louis, Mo., and elsewhere in the United States.
Andred J. Murphy, [28]	Long Island City, New York.	At Boston, Mass., St. Louis, Mo., and elsewhere in the United States.
Thos. P. McCormick,	Detroit, Mich.,	At New York City, New York; Boston, Mass.; and elsewhere in the United States.

Name.	Residence.	Place of Use.
Joseph A. P. Hart,	New York City, New York.	At New York City, New York; Jersey City, New Jersey; and elsewhere in the United States.
H. N. Sanford,	New York City, New York.	At New York City, New York; Jersey City, New Jersey; Boston, Mass.; and elsewhere in the United States.
James McIlvrid,	Jersey City, New Jersey,	At New York City, New York; and elsewhere in the United States.
Wm. Connolly,	Jersey City, New Jersey,	At New York City, New York; Jersey City, New Jersey; and elsewhere in the United States.
George Egan,	Jersey City, New Jersey,	At New York City, New York; Jersey City, New Jersey; and elsewhere in the United States.

Name.	Residence.	Place of Use.
A. C. Irwin,	Chicago, Ill.,	On the Florida East Coast Railway between Miami and Key West, Florida, and elsewhere in the United States.
C. Oberdorf,	St. Augustine, Florida,	On the Florida East Coast Railway between Miami and Key West, Florida, and elsewhere in the United States.
W. S. Greenfield,	San Francisco, Calif.,	At New Orleans, La., and elsewhere in the United States.
Jos. G. Medlenka,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
Jac. Frankel,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
John Green,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.

Name.	Residence.	Place of Use.
Hicklen J. Landers,	Crowley, La.,	At Crowley, La., and elsewhere in the United States. [29]
Philip L. Wilson,	Miami, Fla.,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga.; and elsewhere in the United States.
Ernest Cotton,	Miami, Fla.,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga.; and elsewhere in the United States.
George T. Warner,	Miami, Fla.,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga.; and elsewhere in the United States.

Name.	Residence.	Place of Use.
Richard J. Ring,	Miami, Fla.,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga.; and elsewhere in the United States.
H. C. LePorte,	Jersey City, New Jersey,	At Jersey City, New Jersey, and elsewhere in the United States.
C. H. Crooks,	New York City, New York,	At New York City, New York, and elsewhere in the United States.
A. H. Markwart,	San Francisco, Calif.,	At Pittsburg, Calif., and elsewhere in the United States.
R. B. Muir,	San Francisco, Calif.,	At Fort Madison, Iowa, and elsewhere in the United States.

and by others at present unknown to defendant but whose names and locations defendants pray leave to add by amendment when discovered.

CHADWICK, McMICKEN, RAMSEY & RUPP,
STEPHEN F. CHADWICK,
Solicitors for Defendant.

CHAS. E. TOWNSEND,
WM. A. LOFTUS,
Of Counsel.

Dated: July 7, 1927.

Copy of within amendment to answer received this 7th day of July, 1927.

BATTLE, HULBERT & HELSELL,
Attorneys for Plaintiff.

Filed July 7, 1927. [30]

[Title of Court and Cause.]

ORDER DENYING MOTION FOR CONTINUANCE AND DIRECTING DEFENDANT TO FILE BILL OF PARTICULARS.

This matter coming on for hearing before the above-entitled court and the parties hereto, by their respective counsel, having heretofore submitted to the Court in chambers the defendant's motion for continuance herein and the plaintiff's motion for a bill of particulars herein, and the Court having considered said motions and the affidavits herein and the arguments of counsel, and having announced its conclusion,—

NOW, THEREFORE, conformably to the conclusion heretofore announced, it is by the Court CONSIDERED, ORDERED, ADJUDGED AND DECREED that the motion for continuance herein be and the same is hereby denied, to which ruling on the part of the Court the defendant excepts and its exception is hereby allowed.

IT IS FURTHER ORDERED, ADJUDGED AND DECREED that the ruling of the Court upon the motion for continuance is without prejudice to the defendant moving the Court for leave to supplement its record upon trial by the deposition of such witnesses and the submission of such testimony as could not have been obtained at the trial by the exercise of due diligence. [31]

IT IS FURTHER ORDERED, ADJUDGED AND DECREED, upon the consideration of the motion for a bill of particulars herein, that the defendant, on or before the 6th day of September, 1927, make designation in good faith of such United States patents and foreign patents, and such publications, and such prior uses, as will be relied upon by the defendant at the trial of the above-entitled cause, and that such designation be without prejudice to defendant relying upon other United States patents, foreign patents, publications, and prior uses, as may be reasonably shown to be necessary to the proper defense of the above-entitled cause, because of the evidence produced at the trial on the part of the plaintiff herein, and that all matters of cost in connection with the granting of the bill of particulars herein be addressed to the Court at the

time of the trial of the above-entitled cause, to all of which the defendant excepts and its exception is allowed.

Done in open court this 2 day of September, 1927.

JEREMIAH NETERER,
Judge.

O. K. form
CHADWICK, McM. R. & R.,
For Deft.
BATTLE, HULBERT & HELSELL,
Attys. for Plff.

Filed Sep. 2, 1927. [32]

[Title of Court and Cause.]

DEFENDANT'S BILL OF PARTICULARS.

Now comes the defendant above named, and pursuant to order of Court gives the following lists of patents, publications, and prior uses, which as far as it is advised at present, and without prejudice to correction and enlargement or modification, as may develop or as the Court may direct, will offer at the trial either by way of anticipation or to show the state of the art:

UNITED STATES PATENTS.

Patent Number.	Date.	Inventor.
	Jan. 6, 1809	Upham.
7,060	Jan. 29, 1850	Potts.
45,153	Nov. 22, 1864	Gunning.
47,793	May 23, 1865	Brear.
99,360	Feb. 1, 1870	Sickels.
4,953	June 18, 1872	Sickles (Reissue).
122,498	Jan. 2, 1872	Smith.
204,725	June 11, 1878	Gunning.
233,499	Oct. 19, 1880	Frizell.
250,602	Dec. 6, 1881	Thiollier et al. [33]

UNITED STATES PATENTS.
(Continued.)

Patent Number.	Date.	Inventor.
273,623	Mar. 6, 1883	Smith.
274,103	Mar. 20, 1883	Ayres.
298,990	May 20, 1884	Leedy.
327,307	Sep. 29, 1885	Peters.
338,138	Mar. 16, 1886	Buell.
416,180	Dec. 3, 1889	Neukirch.
425,624	Apr. 15, 1890	O'Neil.
240,265	Apr. 19, 1881	Palmer.
472,072	Apr. 5, 1892	Patterson.
487,606	Dec. 6, 1892	Church.
487,639	Dec. 6, 1892	Pohle.
497,427	May 16, 1893	Hussey and Harsen.
523,838	July 31, 1894	Hussey.
526,529	Sep. 25, 1894	Hussey.

Patent Number.	Date.	Inventor.
526,530	Sep. 25, 1894	Hussey.
526,531	Sep. 25, 1894	Hussey.
526,652	Sep. 25, 1894	Hussey.
542,620	July 16, 1895	Bacon.
542,622	July 16, 1895	Bacon.
555,704	Mar. 3, 1896	Hussey.
568,445	Sep. 29, 1896	Kennedy.
568,742	Oct. 6, 1896	Church.
577,522	Feb. 23, 1897	Wallwork and Wells.
597,023	Jan. 11, 1898	Saunders.
635,270	Oct. 17, 1899	Rix and Donahoo.
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Patent Number.	Date.	Inventor.
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11,456	Aug. 8, 1888	Neukirch. [35]

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Patent Number.	Date.	Inventor.
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322,237	June 19, 1902	Grauer & Cie.

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"Engineering Record," March 12, 1904 (pp. 329, 330 and 331). [39]

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"Le Genie Civil," Dec. 29, 1900, Vol. XXXVIII, No. 9 (p. 145).

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PRIOR INVENTION AND PRIOR USE.

Name.	Residence.	Place of Use.
Edward A. Rix,	San Francisco, California,	At San Francisco, Red Bluff, Oroville and Tulare, all in California, and elsewhere in the United States.
A. C. Dennis,	San Francisco, California,	At Pittsburgh, Pa., Memphis, Tenn., Cincinnati, Ohio, and elsewhere in the United States.

[40]

PRIOR INVENTION AND PRIOR USE.
(Continued.)

Name.	Residence.	Place of Use.
Ohio Connecting Railroad,	Pittsburgh, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.
Thos. W. Rodd,	Pittsburgh, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.

Name.	Residence.	Place of Use.
W. L. Saunders,	New York City, New York,	At New York City, New York, and elsewhere in the United States.
Union Sulphur Co.,	Sulphur, La.	At Sulphur, La., and elsewhere in the United States.
Wm. R. Keever,	Sulphur, La.,	At Sulphur, La., Crowley, La., and elsewhere in the United States.
Samuel W. Maxwell,	Sulphur, La.,	At Sulphur, La., and elsewhere in the United States.
Edmund M. Ivens,	New Orleans,	At Sulphur, La., and elsewhere in the United States.
Thos. S. Leake,	Chicago, Ill.,	At New Orleans, La., and elsewhere in the United States.
J. W. Buzzell,	Boston, Mass.,	At Boston, Mass; East Orange, New Jersey, and elsewhere in the United States.

Name.	Residence.	Place of Use.
Illinois-Central Railroad Co.,	Chicago, Ill.,	At Chicago, Ill., New Orleans, La., and elsewhere in the United States.
W. H. Larkin, Jr.,	New Haven, Conn.,	At LaPorte, Indiana, and elsewhere in the United States.
Cockburn Barrow & Machine Company,	Jersey City, New Jersey,	At Jersey City, New Jersey; New York City, New York, and elsewhere in the United States.
R. A. Shailer,	New York City, New York,	At New York City, New York, Boston, Mass., and elsewhere in the United States.
Thos. P. McCormick,	Detroit, Mich.,	At New York City, New York, Boston, Mass., and elsewhere in the United States.

PRIOR INVENTION AND PRIOR USE.
(Continued.)

Name.	Residence.	Place of Use.
James McIlvrid,	Jersey City, New Jersey,	At New York City, New York, and elsewhere in the United States.
W. S. Greenfield,	San Francisco, California,	At New Orleans, La., and elsewhere in the United States.
Jos. G. Medlenka,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
Jac. Frankel,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.

Name.	Residence.	Place of Use.
John Green,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
Hicklen J. Landers,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
Phillip L. Wilson,	Miami, Florida,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga., and elsewhere in the United States.
Ernest Cotton,	Miami, Florida,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga., and elsewhere in the United States.

Name.	Residence.	Place of Use.
George T. Warner,	Miami, Florida,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga., and elsewhere in the United States.
Richard J. Ring,	Miami, Florida,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga., and elsewhere in the United States.
H. C. LaPorte,	Jersey City, New Jersey,	At Jersey City, New Jersey, and elsewhere in the United States.
C. H. Crooks,	New York City, New York,	At New York City, New York, and elsewhere in the United States.

PRIOR INVENTION AND PRIOR USE.
(Continued.)

Name.	Residence.	Place of Use.
A. H. Markwart,	San Francisco, California.	At Pittsburgh, Calif., and elsewhere in the United States.
R. B. Muir,	San Francisco, California.	At Ford Madison, Iowa, and elsewhere in the United States.

and possibly others.

CHARLES E. TOWNSEND,
CHADWICK, McMICKEN, RAMSEY & RUPP,
Attorneys for Defendants.

Service of copy of the within defendants' bill of particulars admitted this —— day of September, A. D. 1927.

_____,

For Plaintiff.

Filed Sep. 6, 1927. [43]

[Title of Court and Cause.]

DEFENDANTS' DEMAND UNDER EQUITY RULE 58 THAT PLAINTIFF ADMIT IN WRITING THE GENUINENESS OF PUBLICATIONS.

To Concrete Mixing and Conveying Company, and to *to* Battle, Hulbert, Gates & Helsell, and to Messrs. Williams, Bradbury, McCaleb & Hinkle, Its Solicitors and Counsel:

Come now the defendants above named and, under Equity Rule 58, make demand of the plaintiff above named that plaintiff admit:

1. The genuineness of the patents and publications listed in our bill of particulars served this day on counsel for plaintiff;

2. That the dates of issuance of said patents, United States and Foreign, and the dates of application of the said United States patents appearing on the printed or photostat copies thereof are true and correct, subject to correction if error found;

3. That the dates of publication and the name of the publisher or author, of the said several publications, are correct;

4. That the photostat copies of such publications or portions thereof and heretofore offered in evidence in connection with the New York depositions in the cases of this plaintiff vs. Great Western Power Company, In Equity—No. 1804, pending in the United States District Court for the Northern District of California, Southern Division; and of the Plaintiff vs. Stone & Webster, Incorporated, Equity—No. 2747, pending in the United States District Court, District of Massachusetts, and duplicates of which photostats have heretofore been furnished counsel for plaintiff, are true and correct copies of the originals of the [44] pages of such publications or portions thereof as purported.

If such admissions be not made within five (5) days from service hereof, defendant will move the Court for costs of proving said patents, publications, and documents, irrespective of the outcome of the suit.

R. C. STORRIE & COMPANY (a Partnership).

By CHARLES E. TOWNSEND,

CHADWICK, McMICKEN, RAMSEY & RUPP,

Its Attorneys.

[Endorsed]: Copy received.
Date Sept. 6, 1927.
BATTLE, HULBERT & HELSELL,

[Endorsed]: Filed Sep. 6, 1927. [45]

[Title of Court and Cause.]

NOTICE AND INVITATION OF DEFENDANT TO WITNESS TESTS.

To Concrete Mixing & Conveying Company, a Corporation, and to Williams, Bradbury, McCaleb and Hinckle, and to Carey Van Fleet, Esq., and Battle, Hulbert & Helsell, Its Attorneys.

You are hereby advised that on Wednesday, September seventh, 1927, at 4:00 P. M., a series of tests in the handling of various cementitious mixtures, including concrete, by compressed air, will be run at the East Portal of Sunset Tunnel, Municipal Railways Project, in the City and County of San Francisco, California. The evidence, testimony, and results of said tests and the machines there and then to be used will be adduced and used in connection with the *trail* or *trails* of one or the other or all of the following suits based on the McMichael patent No. 1,127,660 of February 9th, 1915, and brought by said Concrete Mixing and Conveying Company, and now pending, to wit:

"In the District Court of the United States, for the Western District of Washington, Northern Division.

CONCRETE MIXING & CONVEYING COMPANY,

Plaintiff,

vs.

R. C. STORRIE & COMPANY, a Partnership,

Defendant.

IN EQUITY—No. 394."

"In the United States District Court, for the Northern District of California, Division Three.

CONCRETE MIXING & CONVEYING COMPANY,

Plaintiff,

vs.

GREAT WESTERN POWER COMPANY OF CALIFORNIA,

Defendant.

IN EQUITY—No. 1804." [46]

"In the United States District Court, for the District of Massachusetts.

CONCRETE MIXING & CONVEYING COMPANY,

Plaintiff,

vs.

STONE AND WEBSTER, INCORPORATED,

Defendant.

IN EQUITY—No. 2747."

You and plaintiff's experts are invited to be present and to witness said tests.

CHAS. E. TOWNSEND,
Attorney for the Foregoing Defendants.
CHADWICK, McMICKEN, RAMSEY & RUPP.

[Endorsed]: Copy received.
Dated Sept. 3, 1927.
BATTLE, HULBERT & HELSELL.

[Endorsed]: Filed Sep. 6, 1927. [47]

[Title of Court and Cause.]

ORDER SETTLING STATEMENT OF PROCEEDINGS AND NARRATIVE OF TESTIMONY.

This cause coming on for hearing this 14th day of February, 1928, upon the motion of the plaintiff for an order approving the statement of proceedings and narrative of testimony given at the trial of the above-entitled action and upon the proposed amendments, additions and objections of the defendant thereto; the plaintiff and defendant being represented by their respective solicitors,—

NOW, THEREFORE, IT IS ORDERED that copies of the depositions of William Keever, S. W. Maxwell, Nicklen J. Landers, John Green, Joseph G. Menlenka, Jac. Frankel, Edmund F. Ivens, Will-

iam H. Larkin, and Thomas S. Leake, in the exact language of the witnesses, be certified by the Clerk of this court and sent to the Circuit Court of Appeals at San Francisco, California, as a part of the record on appeal herein.

That the amendments proposed by the defendant be allowed and made a part of the said narrative of testimony with the following changes and exceptions:

The last paragraph of the first proposed amendment [48] be changed to read as follows:

> "Mr. WILLIAMS.—We have elected to rely upon a somewhat less number of the claims of the patent in suit than are set up in our bill of complaint. We shall rely upon claims 1, 2, 17, 18, 24, 29, 34 and 35 of this patent."

In lieu of the amendment after line 26, page 1, insert the following between lines 26 and 27:

> "Plaintiff's Exhibit No. 4 objected to as not pertinent and not competent. Objection overruled and exception noted."

In lieu of the amendment in line 7, page 2, insert the following between lines 6 and 7, page 2:

> "Defendant objected to plaintiff's Exhibit No. 10 as not pertinent and not competent. Objection overruled and exception noted."

The amendment to line 26, page 6, be allowed and there be added to the same the following:

> "The above question objected to as not germaine and objections sustained.

That from line 14, on page 22, to the end of line 16, on page 22, be stricken and the following inserted:

"Q. Now, when you first learned of this McMichael apparatus and method, were you in a position where the matter was presented to you for your consideration on behalf of a contracting concern? A. Yes, sir.

Mr. TOWNSEND.—Objected to as irrelevant and immaterial.

Mr. WILLIAMS.—This is merely preliminary.

The COURT.—Overruled. Proceed to what is material."

That the balance of the amendment proposed on page 22 be omitted.

That the proposed amendment on page 27 be allowed and that there be inserted prior to said amendment, the following words:

"Q. What, approximately, is the weight of a cubic yard of concrete? A. About two tons."

That the proposed amendment to strike out a portion of page 55 be denied.

That the proposed amendment in lines 22 and 23, page 56, be changed to read as follows:

Insert "Over objection that no proper foundation was laid, witness testified; 'properly mixed concrete forming materials do not have the quality of flowing as do liquids.'"

The statement by Mr. Townsend on page 12-g of the proposed amendment be omitted.

That the proposed amendment in line 20, page 206, line 8 page 216, line 5 page 249, be denied.

That in lieu of all amendments proposed from line 15, page 251 to line 30 on page 255, substitute the exact testimony given by question and answer as shown from line 24 at page 439 to the end of the testimony on page 448 of the transcript of testimony. [49]

In lieu of the amendments proposed from line 19, page 257, to line 1, page 264, substitute the testimony given by question and answer as shown in the transcript of the testimony from line 11, page 451, to the end of the testimony on page 470.

The amendment proposed after line 16, on page 266, is denied.

The first six lines of the proposed amendment after line 23, page 266 be allowed; the balance of said proposed amendment be denied.

In lieu of all amendments from line 24, page 270 to line 15, page 273, there be substituted all of the testimony by question and answer shown in the transcript of testimony from line 30, page 520, to the end of the testimony at page 525.

The proposed amendment in line 12, line 18 and line 19, page 280, be allowed.

That the proposed amendments in line 27 and line 30, page 280 be denied.

That the proposed amendment to line 5 in page 281 and to lines 5 to 10, page 284 be denied.

That the proposed amendment to strike out a portion from line 21 on page 284 to line 1 on page 285 be denied.

That the proposed amendment after line 13, at page 285 be denied.

In lieu of the proposed amendment to strike out a portion of page 285 from line 20 to line 30, inclusive, be denied and there be substituted in lieu thereof the testimony given by question and answer as shown in the transcript of testimony from line 21, page 545 to line 22, page 546.

The proposed amendment in line 2, page 286 be denied.

That the proposed amendments in lines 7, 17 and 24, page 286 be allowed.

That the proposed amendment to strike out from lines 3 to 5 on page 288 be denied.

That the proposed amendment to strike out from line 17 on page 302 to line 27 on page 303 be denied.

That the amendment to strike out from line 3 to line 14 on page 305 be allowed and that there be added thereto, at the end, the following:

"A. Yes, sir."

The proposed amendment after line 16, page 305 be denied.

The proposed amendment to strike out from line 20 on page 305 to line 5 on page 306 be denied. [50]

The proposed amendment to strike out from line 19 to line 24 on page 307 be denied.

That the proposed amendment after line 24, page 311, be allowed and there be added to said amendment, at the end thereof, all of the statements of counsel from line 29 on page 583 to line 21 on page 584 of the transcript of testimony.

Entered.

BOURQUIN,
District Judge.

[Endorsed]: Filed Feb. 14, 1928. [51]

[Title of Court and Cause.]

NOTICE RE FILING PRAECIPE AND FILING STATEMENT OF TESTIMONY.

Messrs. Chadwick, McMicken, Ramsey & Rupp,
Attorneys for Defendant,
Seattle, Washington.

Gentlemen:

Please be informed that the plaintiff has this day filed a praecipe in the above-entitled cause and has prepared and this day lodged with the Clerk of the United States District Court at Seattle, Washington, for your examination, a statement, largely in narrative form, of the testimony and depositions specified in such praecipe.

Also please take notice that on January 18, 1928, at 10:00 o'clock A. M., or as soon thereafter as counsel can be heard, we shall ask the Court to approve the said statement of the evidence and to enter an order in the form hereunto annexed.

WILLIAMS, BRADBURY, McCALEB & HINKLE,
BATTLE, HULBERT & HELSELL,
Counsel for Plaintiff.

Seattle, Washington, January 7, 1928.

Received a copy of the above notice and copies of the therein mentioned praecipe and draft order this 7th day of January, 1928.

WM. A. LOFTUS,
CHARLES E. TOWNSEND,
S. F. CHADWICK,
Counsel for Defendants.

Filed Jan. 7, 1928. [52]

[Title of Court and Cause.]

STATEMENT OF PROCEEDINGS BEFORE JUDGE BOURQUIN, AND NARRATIVE OF TESTIMONY.

BE IT REMEMBERED, That heretofore and on, to wit, September 13, 1927, at the hour of ten o'clock A. M. the above-entitled cause came on regularly for hearing in the above-entitled court and before the Honorable George W. Bourquin, sitting without a jury. The plaintiff appearing by Lynn A. Williams, Esq., C. C. Bradbury, Esq., and A. G. McCaleb, Esq. (of Messrs. Williams, Bradbury, McCaleb & Hinkle), and Frank P. Helsell, Esq. (of Messrs. Battle, Hulbert & Helsell), its attorneys and counsel; the defendant appearing by Charles E. Townsend, Esq., and William A. Loftus, Esq. (of Messrs. Townsend, Loftus & Abbett), and Stephen F. Chadwick, Esq. (of Messrs. Chadwick, McMicken, Ramsey & Rupp), its attorneys and counsel.

Mr. WILLIAMS.— . . . We have elected to reply upon a somewhat less number of the claims of the patent in suit than are set up in our bill of complaint. We shall rely upon claims 1, 2, 17, 18, 24, 29, 34 and 35 of this patent.

After statements to the Court, Mr. Lynn A. Williams, for plaintiff, and Mr. Charles E. Townsend, for defendant, the following [53] exhibits were received in evidence in behalf of the plaintiff:

(1) A certified copy of articles of incorporation of the plaintiff company as Plaintiff's Exhibit No. 1.

(2) A certificate of good standing of the plaintiff company as Plaintiff's Exhibit No. 2.

(3) A certified copy of letters patent in suit to McMichael No. 1,127,600, as Plaintiff's Exhibit No. 3.

(4) The entire record in the suit of Concrete Mixing & Conveying Company vs. Ulen Contracting Corporation, as Plaintiff's Exhibit No. 4.

Plaintiff's Exhibit No. 4 objected to as not pertinent and not competent. Objection overruled and exception noted.

(5) A certified copy of the opinion of Judge Learned Hand in Concrete Mixing & Conveying Company vs. Ulen Contracting Corporation, as Plaintiff's Exhibit No. 5.

(6) A certified copy of the opinion of Judge Augustus N. Hand in Concrete Mixing & Conveying Company vs. Ulen Contracting Corporation, as Plaintiff's Exhibit No. 7. [54]

(7) A certified copy of the decree in Concrete Company vs. Ulen was admitted in evidence as Plaintiff's Exhibit No. 8.

(8) A certified copy of the Mandate of the Court of Appeals in Concrete vs. Ulen was admitted in evidence as Plaintiff's Exhibit No. 9.

(9) A certified copy of the decree on the Mandate in Concrete vs. Ulen was admitted in evidence as Plaintiff's Exhibit No. 10.

Defendant objected to Plaintiff's Exhibit No. 10 as not pertinent and not competent. Objection overruled and exception noted.

(10) The entire record in the case of Concrete Mixing & Conveying Company vs. Powers-Kennedy Company was admitted in evidence as Plaintiff's Exhibit No. 11.

TESTIMONY OF ROY C. HACKLEY, FOR PLAINTIFF.

ROY C. HACKLEY, plaintiff's witness.

My name is Roy C. Hackley. I am 47 years of age, and reside at Berkeley, California. I am a construction engineer. I am interested in the business of selling or leasing apparatus for the pneumatic placing of concrete. I saw the apparatus used by R. C. Storrie & Company in lining the Skagit River tunnel. I designed that apparatus and installed it or superintended its installation. I saw it in operation. I continued to work on the Skagit job until the completion of the contract. I

(Testimony of Roy C. Hackley.)

did not have anything to do with the designing of a pneumatic concrete placing apparatus which was employed by this same R. C. Storrie & Company in connection with the Twin Peaks job in California. I saw the pneumatic placing equipment which was used by R. C. Storrie & Company on the Twin Peaks job. A portion of the apparatus which was used by R. C. Storrie & Company on the Twin Peaks job was also employed in the Skagit River job, that is to say, one of the concrete guns or placers which had been used on the Twin Peaks job was used on the Skagit River job. [55]

The apparatus which the Storrie Company first used on the Twin Peaks job, and subsequently used on the Skagit River job, was a vertical container which held about ten cubic feet of mixed concrete. It had a door at the top to close it, an air intake near [56] the top and two air pipes leading to the elbow at the bottom of the container. This apparatus was used on the Skagit job at the beginning, but was later discontinued.

Having had called to my attention a certified copy of an application for United States patent, filed on March 26, 1924, by Roy C. Hackley, Serial No. 702,056, I say that I am the Roy C. Hackley who executed and filed such application for United States patent.

Q. Now, I call your attention particularly to the certified copy of a so-called cancelled drawing in the matter of that application and to the first photographic reproduction of a drawing as it ap-

(Testimony of Roy C. Hackley.)

pears in this certified copy of the file-wrapper and also to the specification of this application for patent, beginning on line 29 of page 5, and ending on line 13 of page 8 of the specification, and I ask you whether these illustrate and describe the apparatus which you say you designed and which was used by the defendant R. C. Storrie Company on this Skagit River project?

A. Yes, that is correct.

Q. Now, did all of the detail of the apparatus as used on the Skagit River job by Storrie & Company correspond exactly with what is shown in your patent application drawing? I ask particularly relative to the point at which the air-pipes enter the chambers. Do they enter at the end or enter at the sides?

A. They enter at the end and at different points on the bottom.

Q. This patent drawing shows they all enter at the end, does it not?

A. No, it does not. [57]

Q. Can you point to one here shown as entering somewhere other than at the end?

A. One end is there and one there and one in here.

Q. The end you say—the end, as you say, but they enter, do they not, all of them, in this patent drawing—

A. (Interrupting.) They enter at the end, yes, but they enter there at those points.

Q. In the apparatus as employed on the Skagit

(Testimony of Roy C. Hackley.)

River Tunnel do they all enter at the end in that fashion (indicating) or in some other way?

A. In the first one they entered at those points—they entered at the bottom—

Q. (Interrupting.) They entered or ended?

A. The air left the pipe at the same points.

Q. I am asking you where the pipes entered into the chamber. Did they enter at the end, as shown on this patent drawing, or did they enter the chamber at the side?

A. On the first tried machine they entered at the end and on the bottom.

Q. Some on the bottom?

A. Yes, sir, some on the bottom—those same points.

Q. Will you look at this drawing and state whether this correctly represents the arrangement of the pipes and particularly the way in which they enter the chamber in the apparatus as used on the Skagit River project?

A. Your pipe is incorrect.

Q. The one which is marked 27-A?

A. That pipe is incorrect (indicating). That pipe is incorrect (indicating.) And that pipe is incorrect—the location.

Q. Wasn't there in that apparatus a pipe which was cast at the end at this point? [58]

A. No, there was not, marked 29.

Q. Marked 29, yes.

A. No, there was not.

(Testimony of Roy C. Hackley.)

Q. And you say that there was no pipe corresponding with the one marked 27–A?

A. That pipe did not enter that way.

Q. How did it enter?

A. This pipe entered at the end (indicating) and this pipe entered at the bottom in a similar manner to that. It was not a right angle.

Q. Is the illustration of the manner in which pipe 26–A enters substantially correct?

A. Substantially correct, yes. There was an angle there. It did not have that direct right angle.

Q. More of a bend in there?

A. More of a bend in there.

Q. Was there more than one of these apparatuses employed on the Skagit River Project, that is, apparatus that you designed?

A. Yes, there were several.

Q. There were several? A. Yes, sir.

Q. Were they all identically alike?

A. The principle was the same in all of them.

Q. But the bends and ends in those things differed—

A. (Interrupting.) That was only used a very short time.

Q. This one, as shown here (indicating)?

A. Yes, sir.

Q. Subsequently the air pipes all came in from the end?

A. Subsequently the air pipes all came in from the end. They came in through the end, but they

(Testimony of Roy C. Hackley.)

terminated at the same point that they show there. [59]

Q. That is, after the first one—

A. (Interrupting.) They terminated—they came in through the end but they terminated at the same point that they show there.

Q. After the first—

A. (Interrupting.) They terminated as shown on the patent drawing.

Q. In all the machines they so terminated, didn't they? A. Yes, sir.

Q. That is, the pipes corresponding with those marked on this last drawing 27–A, 26–A, 25–A, there were such pipes in all of the several placers but the method in which they were led in differ in the successive machines.

A. Yes, sir. This led in so that the air came directly on a line with the bottom of each one.

Q. Do you attribute any difference in mode of operation to those slight differences which you alluded to? A. No; no difference.

Mr. WILLIAMS.—We offer in evidence the portions of the Hackley file-wrapper and drawings identified by the witness—that would be the petition, the oath, the specification as originally filed, the first drawing and the cancelled drawing. We ask that they be marked as Plaintiff's Exhibit No. 12.

Mr. TOWNSEND.—That is objected to, your Honor, for the reason that they are bringing in the entire file of proceedings of the Patent Office in

connection with a patent that is not the patent in suit. A plain copy of the patent as finally issued would serve the purpose. This only serves to encumber the record and increase the cost.

The COURT.—What is the object? [60]

Mr. WILLIAMS.—Well, counsel were very careful to offer not the entire file-wrapper, but a limited part of the specifications and drawings which this witness has testified are descriptive of the apparatus used by the defendant.

The COURT.—Upon that statement they will be admitted. Proceed.

(Whereupon the Hackley File was admitted in evidence as Plaintiff's Exhibit 12.)

Mr. WILLIAMS.—And I offer in evidence the large drawing identified by the witness, marked "Defendant's Apparatus," and ask that it be marked Plaintiff's Exhibit 13.

Mr. TOWNSEND.—We object to that as no proper foundation having been laid. We do not know anything about this drawing. The witness has said that it is not a correct drawing of his apparatus.

The COURT.—It will be rejected at this time. Make one, if you can, based upon the witness' testimony.

Mr. WILLIAMS.—I would like to have this drawing that the witness has testified regarding marked for identification as Plaintiff's Exhibit 13.

The COURT.—It may be so marked.

(Whereupon a drawing was identified as Plaintiff's Exhibit 13.)

(Testimony of Roy C. Hackley.)

Cross-examination.

Q. What was the occasion, Mr. Hackley, of getting up that gun?

A. The unsatisfactory working of the gun that we had used at first. The work was unsatisfactory to the engineers in charge of the job for the City of Seattle.

(The above question objected to as not germane and objection sustained). [61]

The old gun was used on the Skagit River for possibly two months. The Hackley gun was used on the Skagit River job until the completion of the contract. That was approximately a year and a half.

TESTIMONY OF R. C. OXENHAM, FOR PLAINTIFF.

R. C. OXENHAM, plaintiff's witness.

My name is R. C. Oxenham. I am 34 years old. I reside at Chicago, Illinois. I was in a tunnel forming part of the gorge plant of the Skagit River project of the city of Seattle, located in the State of Washington, near Rockport, on October 10, 1923. I was accompanied on this visit by Mr. Albert G. McCaleb. R. C. Storrie & Company was doing work on that tunnel. I saw a pneumatic concrete placing apparatus in operation in the tunnel at that time. I have photographs which were taken at the time of my visit and which illustrate what I saw. I produce four of these photographs. These

(Testimony of R. C. Oxenham.)

photographs were taken in my presence. They are flashlight photographs.

(The four photographs marked respectively 14–A, 14–B, 14–C and 14–D were admitted in evidence as plaintiff's exhibits.)

Q. Can you produce a drawing of the machine made by you or at your instance in accordance with your observation made at that time?

A. Yes, sir.

Q. Will you do so. (Witness produces drawing.)

Mr. WILLIAMS.—We offer in evidence the two drawings produced by the witness and ask that they be marked Plaintiff's Exhibits 15–A and B, respectively.

Mr. TOWNSEND.—Objected to as not sufficiently proven.

The COURT.—Interrogate your witness further to see if he is competent—if he made them accurately. [62]

Q. Just tell what you did in examining the apparatus which you saw there at that time.

A. Well, we examined both the exterior and the interior of the machine.

Q. How did you examine the interior.

A. Why, we had the man that was operating the concrete placer machine open up the door. When the door was opened why we examined it by means of our flashlight on the inside and tested the air that was coming out of the different pipes.

Q. Did you see where the various pipes led?

(Testimony of R. C. Oxenham.)

A. Yes, sir.

Q. Where they were directed? A. Yes, sir.

Q. You saw that with your own eyes, did you?

A. Yes, sir.

Q. Did you see the pipe valves? Perhaps you had better name the things that you saw there—just the parts that you saw.

A. Well, we saw the metal chamber and the opening.

Q. What opening do you mean?

A. The opening on the top of the machine whereby they put the concrete in.

Q. Did you see the concrete go in there?

A. Yes, sir.

Q. Was the opening left open?

A. No, not after the concrete was put in. It was closed tight.

Q. Now, what else did you see?

A. We saw the various air pipes.

Q. How many?

A. There were five in all. One was closed.

Q. Which one was closed?

A. No. 29 on there.

Q. How did you determine that? [63]

A. Why, when the top was opened why we put our hand in there and the man turned the valve on and there was no air came out of there. It was capped.

Q. Did you see the pipe from the outside—this capped pipe? A. Yes, sir.

Q. Now, these other pipes on the bottom, how did you observe them?

(Testimony of R. C. Oxenham.)

A. We examined them carefully and saw that some of them extended downwardly and along the side or on the outside of the chamber and entered the chamber at various points along the bottom of the chamber.

Q. Did you determine where they terminated.

A. We did.

Q. Those several pipes?

A. Yes, sir.

Q. By looking at them? A. Yes, sir.

Q. Did you make any notes or memoranda of what you saw at that time? A. Yes, sir.

Q. How soon were these drawings prepared after your examination of the apparatus.

A. Why, I should say about a month; when we got back to Chicago.

Mr. WILLIAMS.—Now, again I offer the drawings. Just let me ask one question.

Q. Do these drawings which you have produced accurately and correctly illustrate what you observed as you have described? A. Yes, sir.

Mr. WILLIAMS.—Again we offer them in evidence and ask that they be marked Plaintiff's Exhibits 15–A and 15–B.

Mr. TOWNSEND.—We object to that. They only represent the opinion of this witness and no proper foundation has been laid. [64]

The COURT.—Let me see them. Are you a draftsman?

(Testimony of R. C. Oxenham.)

A. No, sir.

(By the COURT.)

Q. Did you make these? A. No, sir.

Q. You did not make them? A. No, sir.

The COURT.—I doubt whether they are properly admissible or competent. Of course, the objection is not made on that ground. They will be admitted over objection. If not entitled to consideration the Court will give them none. For the sake of the record counsel's exception will be noted. Proceed. Anything further with the witness?

Mr. WILLIAMS.—I think not.

(The drawings produced by the witness were received in evidence as Plaintiff's Exhibits Nos. 15–A and 15–B.) [65]

Cross-examination.

I am office manager for C. C. Erd & Company—mortgage loans. I was going west on my vacation at the time I visited the Skagit River project. I had had no particular interest in concrete machinery before that time. I had never seen any machines of that sort before that time. I have seen some of these machines since that time. About two and a half yards of concrete was placed in the machine which I saw at the Skagit River project. I say two and a half cubic yards because it looked that way to Mr. McCaleb and me, and then I asked the man that operated the gun and he said it was around two and a half cubic yards. [66]

Q. You took his word for it; is that right?

A. Well, his word and Mr. McCaleb's.

(Testimony of R. C. Oxenham.)

Q. And had that machine been used before that charge was put in that you observed—had it been in use?

A. Yes, they were using the machine when we got up to the tunnel.

Q. Was it within the tunnel or outside?

A. Inside of the tunnel.

Q. How far from the mouth of the tunnel?

A. Approximately halfway up the tunnel.

Q. What distance would that be?

A. One mile.

Q. Was it dark in there?

A. Well, there were electric lights every now and then. You could at least see your way going up the tunnel, and we had a guide with us.

Q. When you looked into the machine or receptacle there with your headlights, how much concrete was in the bottom.

A. Well, when we looked in—he let us look in after the concrete had gone through into the discharge pipe.

Q. Were the sides—was the inside of the receptacle polished and clean or did they have concrete sticking to them?

A. It was kind of watery stuff. It was not what you would call clean.

Q. That was in the bottom?

A. Yes, kind of aggregated down there.

Q. Did you measure any of those pipes at the time yourself? A. No.

(Testimony of R. C. Oxenham.)

Q. You took no measurements, I suppose, at the time? [67]

A. Not of the pipes. I measured the main chamber—stepped it off with our feet the best we could.

Q. Any operation that was given of that machine you accepted as told you by the operators or by Mr. McCaleb?

A. Well, I had a very good idea myself after looking at it just how the machine operated and so forth. I did not take their word for everything.

Q. But you took their word for some things?

A. Some of the technical points, yes, sir.

Q. When the air was turned on, and how it was turned on, and where?

A. Well, we could tell that by the valves there, and also when he let us look inside of the chamber when it was opened.

Q. Who made the sketches that are here?

A. They were made in Mr. McCaleb's office.

TESTIMONY OF ROY C. HACKLEY, FOR PLAINTIFF (RECALLED).

ROY C. HACKLEY, recalled for plaintiff.

Q. Mr. Hackley, will you look at these photographs that Mr. Oxenham produced and state whether they appear to represent the apparatus designed by you, or one of the apparatuses designed by you and used in the Skagit Tunnel by R. C. Storrie & Company. Just say whether it does or not. A. It does.

(Testimony of Roy C. Hackley.)

Q. Are those proper photographs of this apparatus? A. They appear so to me.

Q. Better take the chair. Let me call your attention particularly to what appears to be a pipe leading in at the end of the chamber which point on this photograph is marked 25 in red. A. Yes. [68]

Q. Was there such a pipe in one of those apparatuses? A. Such a pipe was not used.

Q. Was it capped inside?

A. It may have been capped but it was not used. If it was, someone capped it.

Q. Well, at any rate—

The COURT. — (Interrupting.) He has answered that fully. It was not used.

Q. Now, there is illustrated on this drawing Plaintiff's Exhibit No.—what was this number for identification—No. 13 for identification a pipe leading into the chamber at 29 and corresponding in its location and size with the one shown as 29 on that photograph?

A. The photograph does not show as much as is shown there. I cannot say exactly.

Q. Well, all that the photograph does not show is the cap on the inside; is that right?

A. It does not show the connection with the manifold. It does not show where that pipe came from.

Q. Looking at this other photograph—the last one in this series. That does show it connected to the manifold, does it?

(Testimony of Roy C. Hackley.)

A. That does show it connected to the manifold, yes, sir.

Q. Let us not spend much time on this, Mr. Hackley, unless it is necessary. Isn't it true that in that apparatus there was an unused pipe leading down to the pipe in substantially the way shown at 29—

A. (Interrupting.) There was with one of those guns, yes.

Q. Now, won't you look at these photographs also and state whether they show the air pipes leading down on the outside of the chamber—the pipes which subsequently were connected in some way to the bottom of [69] the chamber to jets directed toward the outlet?

A. They show them on the outside and leaving on the bottom.

Q. And that is the way it was arranged on at least one of these machines? A. Yes, sir.

Q. These photographs show also the inclination on which the chamber was set, do they not?

A. That inclination was not intentional.

Q. Well, it is present in this photograph, isn't it?

A. I do not know what the grade is—what the grade of that tunnel was, whether it was a three and a half per cent grade or not. And I do not know which direction that was in.

Q. Well, at any rate, the photograph shows the chambers set on an inclination?

A. It shows the chamber set on an inclination with the track.

Q. And the chambers were so set in some instances on this work, were they not?

(Testimony of Roy C. Hackley.)

A. Not intentionally.

The COURT.—Cross-examine.

Mr. WILLIAMS.—I think now with this further testimony I shall offer in evidence the drawing which was formerly marked for identification as Exhibit 13. I think that is sufficiently established now.

The WITNESS.—That pipe never was in there.

Mr. TOWNSEND.—29 you mean?

The WITNESS.—Yes.

The COURT.—The objection will be sustained. Get a correct drawing made and you can produce it, and do not produce one that may mislead the Court. Cross-examine if you have anything with this witness. Proceed with the cross-examination. [70]

Cross-examination.

(By Mr. TOWNSEND.)

Q. So pipe 29 which you see in this machine was not used if put on in subsequent machines?

A. No, it was not.

Q. Did you ever at any time admit air into your gun anywhere except at the bottom? A. No.

Mr. TOWNSEND.—That is all.

(Witness excused.)

Mr. WILLIAMS.—I will recall Mr. Oxenham again.

The COURT.—What is this witness for?

Mr. WILLIAMS.—I want to ask him particularly about this pipe 27-A, whether he saw that identical

(Testimony of Shirley Houghton.)

one extending up there in that manner. It is a matter of utter insignificance, I grant you that—

The COURT.—Well, we will not hear him now.

Mr. TOWNSEND.—It is incompetent.

The COURT.—Call your next witness if you have one.

Mr. WILLIAMS.—Your Honor, I think I shall offer by the testimony of Mr. Oxenham to show that he observed that particular pipe extending in that way.

The COURT.—Do not recall him now. If you have another witness proceed or you rest. Take your choice. The Court assumes that counsel has prepared his case outside of court on his time and is not preparing it on mine, and if you have any witnesses I want you to present them with some degree of diligence and not wait and wait and wait. [71]

TESTIMONY OF SHIRLEY HOUGHTON, FOR PLAINTIFF.

SHIRLEY HOUGHTON, plaintiff's witness.

My name is Shirley Houghton. I am 44 years old. I live at San Francisco, California, and am a construction engineer. I saw pneumatic concrete placing machines which were used by R. C. Storrie & Company at several different places. The first place I saw such a machine used by the defendant was on the Mile Rock tunnel at San Francisco.

(Testimony of Shirley Houghton.)

Mr. TOWNSEND.—If your Honor please, I object to any testimony in regard to this different work done outside of this district. This is a suit laid on the Skagit River job.

Mr. WILLIAMS.—If the Court please, the patents are as broad as the United States and any act of infringement anywhere, of course the defendant is liable for it.

The COURT.—What infringement have you charged—

Mr. WILLIAMS.—We have charged simply infringement.

Mr. TOWNSEND.—What they are trying to do your Honor, is to prove an estoppel which they have not pleaded and which they tried to plead in paragraph 5 of the bill of complaint and which was struck out. If you will read paragraph 5, that is what they are getting at, and they brought this gentleman from San Francisco and the paragraph 5 was struck out by order of Court on motion of the defendant. So they are not permitted now to offer proof of an alleged estoppel.

The COURT.—Was paragraph 5 stricken from your complaint?

Mr. WILLIAMS.—Yes, your Honor.

The COURT.—You may show the use of the machine, but nothing in respect to the estoppel pleaded.

* * * * * * * * *

A. It was about the year 1914, to the best of my recollection. [72]

(Testimony of Shirley Houghton.)

Q. Now, how did you come to see that machine at that time?

Mr. TOWNSEND.—That is objected to as irrelevant and immaterial.

The COURT.—Sustained. I do not care how he got there.

WITNESS.—It was the so-called McMichael machine. I know it was the McMichael machine because I was the licensee of the Concrete Mixing & Conveying Company for the Western section of the country, and in that capacity we entered into a contract with Storrie & Company for the installation of these machines. The partnership of which I was one of the members installed that first machine which I saw in the Mile Rock tunnel. The name of that partnership was Pacific Concrete Placing Company. I next saw pneumatic concrete placing machines used by the defendant on the Twin Peaks tunnel in San Francisco.

Q. Will you describe the machines in a general way which you there saw?

A. The machines were the McMichael type of mchines with additional air ports added to the side and the heel of the elbow. I investigated as Mr. Storrie had told us that he would put our machines on that job. We later found out that he had built machines of his own manufacture and put them on there. We went out to investigate and see.

Mr. TOWNSEND.—I move that the answer be stricken as not responsive.

(Testimony of Shirley Houghton.)

The COURT.—It will be stricken. [73]

The machines which the Storrie Company used on the Twin Peaks job were not McMichael machines furnished by me as an agent or licensee of the plaintiff. These machines which I saw on the Twin Peaks job were vertical in type, similar in construction to the McMichael machines which were installed on the Mile Rock tunnel, except that they were of larger capacity and were provided with a few additional air ports leading into the shell of the machine. I made complaint or representation to the Storrie Company relative to its use of these machines not furnished by me or by the plaintiff. As a result of this complaint, R. C. Storrie & Company entered into a compromise contract, with us under which they paid us royalty for the use of these machines and agreed to return the machines to us at the completion of the Twin Peaks job.

Cross-examination.

(By Mr. TOWNSEND.)

Q. On the Mile Rock job where you say that a so-called McMichael gun was used, where was the air chamber into that receptacle?

A. It was admitted at several different points. There were air ports on the shell of the vertical—there was a sort of a cone-shaped receiver around the shell as well as into the heel of the exhaust elbow on the bottom of the shell.

Q. Where you had air coming into this McMichael receptacle at the top and on the material

(Testimony of Shirley Houghton.)

and then you also had air coming into the elbow outside of the shell and adjacent to the outlet to impel the concrete through the discharge pipe?

A. It would depend upon the operator just how he might admit the air. He could not admit it around the shell [74] if he so desired and he could admit it at the bottom or he could admit it on the shell or at the bottom simultaneously or in between. Different operators use a little different practice in the exact manner in which they admit the air into the chambers containing the concrete materials.

Q. A so-called chamber jet was outside of the receptacle, wasn't it, where it entered the elbow?

A. The air jet?

Q. Yes.

A. The air port into the heel of the elbow could be termed a jet. It was into the mixer compartment as there was no division between the elbow and the conical chamber of the mixer.

Q. And all the air did not go into the receptacle then but some of it went into the discharge pipe and separate of the shell.

A. It could go up into the receptacle.

Q. I am asking as to the layout of the pipe.

A. You refer to this particular job?

Q. Yes. A. The Twin Peaks job?

Q. I am speaking of the Mile Rock job.

A. The Mile Rock job?

Q. Yes.

(Testimony of Shirley Houghton.)

A. As I said before that would be the way the operator would happen to handle his valves as to where the air would go first.

Q. He might let some in at the top of the receptacle or he might let some in at the heel outside of the receptacle, is that right? [75]

A. He might do it simultaneously or he might do it in behind—using one valve as ahead of the other —or he might use the other one first. It depends on the condition along the pipe-line and what he wished to accomplish.

Mr. TOWNSEND.—That is all.

Mr. WILLIAMS.—That is all.

TESTIMONY OF H. B. KIRKLAND, FOR PLAINTIFF.

H. B. KIRKLAND, plaintiff's witness.

My name is H. B. Kirkland. My age is 46. I reside at Evanston, Illinois. I am chief engineer of Concrete Mixing & Conveying Company. I have occupied this position as chief engineer since 1913. I was trained as an engineer. I have been engaged in the practice of engineering.

Q. Now, what briefly is the business of the plaintiff, the Concrete Mixing and Conveying Company?

A. Manufacturing and leasing and the operation of pneumatic machines for concrete placing.

Q. What kind of pneumatic machines?

A. Concrete machines—pneumatic concrete machines.

(Testimony of H. B. Kirkland.)

Q. Are you familiar with the McMichael patent? Have you read it? A. Yes, sir.

Q. Does the Concrete Mixing and Conveying Company lease machines purporting to embody the invention of the McMichael patent? A. Yes, sir.

WITNESS.—I produce a photograph of the commercial apparatus as leased by the plaintiff.

(The photograph produced by the witness was admitted in evidence as Plaintiff's Exhibit No. 16.) [76]

Q. How long has the plaintiff been making or having made and leasing apparatus such as is shown in this photograph?

A. Since about 1909, I think.

* * * * * * * * *

Q. Well, from your personal knowledge how long? A. Since 1913.

WITNESS.—I produce a cross-section drawing of the pneumatic placing apparatus of the McMichael patent as manufactured and leased by the plaintiff, and I also produce a drawing showing [77] the pipe connections. This is the commercial form of the plaintiff's apparatus.

(The drawings produced by the witness were admitted in evidence as Plaintiff's Exhibit No. 17, Drawings A and B.)

These drawings which I have produced represent the details of the construction of the commercial device as shown in the photograph just produced by me.

(Testimony of H. B. Kirkland.)

A. Yes, sir; I have a book here with several pictures in it showing construction jobs.

Q. Won't you turn over these photographs of this booklet and state rapidly what they show in a general way.

Mr. TOWNSEND.—Your Honor, we object to this unless some foundation is shown that this man or his company took and made these jobs or did the work on them and that he took these photographs. If he simply gathered haphazard here and there photographs on various work, of course it is nothing but hearsay and irrelevant and incompetent.

The COURT.—Prove their competency if you desire. I do not think that they have been proven yet. The objection is good.

Q. These photographs which you say you have here, were they taken by you or at your instance?

A. Some of them were on jobs where I supervised the installation of the machanes.

Q. Did you see the work on all of the jobs which you have photographs of here?

A. Most of them; not all of them.

Q. Do the photographs illustrate what you saw on those jobs, and about those jobs?

A. Yes, sir. [78]

Q. Were those the jobs on which this McMichael pneumatic placing apparatus was used?

A. Yes, sir.

Q. Do the photographs show that apparatus in use?

(Testimony of H. B. Kirkland.)

A. Some of the photographs show the machines in the tunnel.

Q. Now, won't you turn over the photographs in that book and state what is shown by those you have personal knowledge of. That is where you saw the work yourself and either took the photographs or had them taken.

A. Here is a view of the interior of the Diana Tunnel on the Louisville and Nashville Railway, showing the discharge pipes and the forms.

Q. You will have to speak louder. Talk to me. Hold your voice up.

A. Here is a view of the interior of the St. Louis Water Works Tunnel showing the discharge pipe flowing over the top of the forms.

The COURT.—What point will this make clear in the patent itself? No controversy over the fact that this concrete is shot out through this pipe and over the forms, I have no doubt.

Mr. WILLIAMS.—I presume there will not be, but the photographs will show how it is done and the situations in which it is done, which I think is important.

The COURT.—I cannot see how it will help us at a decision at all. The question is whether their machine is your machine; whether your patent is valid and whether they are using machines like yours. Proceed. [79]

Mr. WILLIAMS.—Well, I should like to offer in evidence the book of photographs as Plaintiff's Exhibit 18.

Mr. TOWNSEND.—The offer is objected to on the ground that it is incompetent, irrelevant and immaterial and not bearing on any issues of the case.

The COURT.—Let me see the book.

Mr. TOWNSEND.—The patent is not particularly concerned with the building of tunnels. It has to do with transportation of concrete. These photographs also show interior tunnel construction.

The COURT.—Objection sustained. It is not necessary at all. Proceed with the witness.

(Book of photographs identified as Plaintiff's Exhibit 18 and admission in evidence denied.)

Q. I think I will ask you, Mr. Kirkland, to explain or describe very briefly how a concrete lined tunnel is built. I do not want you to go into any elaborate detail.

Mr. TOWNSEND.—I make the same objection, your Honor, that this is a patent that speaks for itself.

The COURT.—Yes.

Mr. TOWNSEND.—And it mentions the word "tunnel" only once.

The COURT.—Sustained.

Mr. WILLIAMS.—This patent is addressed to persons skilled in the art, and I should like an opportunity to make a record of the condition of the art and the art in which it is to be employed. I understand that the Court sustains the objection. I would like to have the question read.

(Testimony of H. B. Kirkland.)

(Whereupon question was read as follows: [80] "I think I will ask you, Mr. Kirkland, to explain or describe very briefly how a concrete lined tunnel is built. I do not want you to go into any elaborate detail.")

The COURT.—I cannot see how that is necessary. The question is this machine, how it functions and how it is made in relation to the parts; whether the machines of the defendant infringe your patent. But as to how a piece of work is carried on or how tunnels are excavated, I cannot see how that will enlighten us any. If it should appear that it is competent after their case, you will have a chance on rebuttal. Objection sustained.

Mr. WILLIAMS.—I would like to have an exception.

The COURT.—Note it.

The McMichael apparatus has been used mainly in tunnel work for lining the tunnels with concrete.

I first learned about the use of this McMichael apparatus in Cleveland, Ohio. I heard that McMichael was experimenting with a machine on the Dennison Viaduct where he was placing concrete through a 6″ pipe, 80′ in height. I was then engineer for the contractor in charge of the construction of the Rocky River Bridge there. This was in 1909. Since that time I have been familiar with the use of these McMichael apparatuses and their methods. This has been my business with the plaintiff company, since 1913.

(Testimony of H. B. Kirkland.)

In reply to a request by counsel that I name some of the tunnels or other large projects upon which contractors have, under lease or otherwise, used the McMichael apparatus of the plaintiff company in the lining and handling of concrete, I will say that we have lined the St. Louis Water Works Tunnel, [81] a tunnel about 2400 feet long and 8 feet in diameter; the Summit Tunnel of the C. B. & Q. Railroad in Wyoming; a couple of tunnels for the city of Memphis Water Works—rather drainage 16 feet in diameter, under air pressure. The Diana Tunnel of the L. & N. Railroad. Several tunnels on the Southern Pacific. I think there were nineteen tunnels altogether there. The New York Subway work, the Chicago Water Works eight miles long, and the Wilson Avenue tunnel.

I here produce a list of tunnel jobs, being tunnel jobs constructed by the use of the McMichael apparatus, under license or lease from the plaintiff company.

(The list of jobs produced by the witness was admitted in evidence as Plaintiff's Exhibit No. 19.)

Q. Now when you first learned of this McMichael apparatus and method were you in a position where the matter was presented to you for your consideration on behalf of a contracting concern? A. Yes, sir.

Mr. TOWNSEND.—Objected to as irrelevant and immaterial.

Mr. WILLIAMS.—This is merely preliminary.

(Testimony of H. B. Kirkland.)

The COURT.—Overruled. Proceed to what is material.

WITNESS.—At that time I was engineer for the contractor of the Rocky River Bridge built in Cleveland, Ohio and we thought of using it for placing concrete in the arches of that bridge. The arches were the longest in the world.

Q. And with what conclusion? Did you confer with their people about it?

A. Yes, I conferred with the contractor.

Q. You speak so softly. I barely can hear you.

A. Yes. We conferred with the concern in the contracting [82] business.

Q. And what was that contracting company—what was its name?

A. I have forgotten that.

The COURT.—Well, if he has forgotten, pass on. [83]

Q. What was your conclusion after having the McMichael matter proposed to you for use in that work?

Mr. TOWNSEND.—We object, your Honor, on the ground that this is not proper.

The COURT.—What is the object of this?

Mr. WILLIAMS.—I want to show that engineers, when this plan of operation was first proposed regarded it as an impossible matter of achievement, and to show what the state of feeling in the art was relative to the thing proposed.

Mr. TOWNSEND.—That adds nothing to what the patent shows itself. They must stand on the

(Testimony of H. B. Kirkland.)

patent and not on whether or not we are to come within it.

Mr. WILLIAMS.—Of course we must stand upon the patent, but I believe we are entitled to show what the condition of the engineers—what the feeling of the engineers, what the belief of the engineers in regard to this art was at the time that this proposal was first made.

The COURT.—I cannot see that it is material. You can show what the art was and how far it has expanded it, if you desire. Objection will be sustained.

Q. To what extent does the pneumatic placing of concrete by the means and method of the McMichael patent gun come into use in connection with the lining of tunnels?

A. Practically every tunnel of importance in the country to-day uses the pneumatic method of lining.

Q. Is this method an apparatus of special value in tunnel work as compared with other concrete work such as paving or building operations? [84]

A. I should say that the use of pneumatic methods, in comparison to old methods, save—one costs one-third or one-half of what the old method cost.

Q. In connection with what class of work?

A. Tunnel lining. That is, in ordinary tunnels. Of course, tunnels that are build under air pressure, in that case they save a great deal more.

Q. Is there any reason why this McMichael

(Testimony of H. B. Kirkland.)

method and apparatus is of such special utility or value in tunnel work as compared wih other concrete work. For example, in foundation walls or building floors.

A. I don't think that I understand you.

Q. Well, you have said that this apparatus and this method was used to the exclusion of everything else in tunnel lining, haven't you?

A. Yes, sir.

Q. It is not so used to the exclusion of everything else in making concrete buildings?

A. No, sir.

Q. Why is it that it is used exclusively and to the exclusion of everything else in tunnel work?

A. Because of the cost of air.

Mr. TOWNSEND.—I object to that statement by counsel. In the first place it is not the testimony of the witness, and in the second place it is not proven, and they cannot prove it.

The COURT.—Cannot prove what?

Mr. TOWNSEND.—Cannot prove that this pneumatic placing of concrete is exclusively used in tunnel work.

The COURT.—He has not said so. That shows for itself. The difficulties of placing it are more in tunnel work than outdoors, of course. He may answer. [85]

A. The cost of making air is a big factor in the placing of concrete pneumatically, and would prohibit its use in ordinary outside work where there is not much—

(Testimony of H. B. Kirkland.)

Q. (Interrupting.) Did you hear the answer that Judge Bourquin just gave?

The COURT.—Do not let him approve my statements in advance. Those things are obvious. I do not always need to be told that two and two make four. I might, sometimes.

Practically every tunnel of importance in the country is now lined by the pneumatic method of placing concrete. I have made it my business since 1913 to learn about these tunnel jobs as they came along and to try to get the contract for the use of this apparatus. This has been my main business since 1913.

Q. Now, did you in that way or in the course of your work as chief engineer of the plaintiff company here learn of the project of the City of Seattle to build this Skagit River Tunnel?

A. Yes, sir.

Q. Now, when did you learn of that? If you have correspondence or anything to aid your recollection get it out and refresh your recollection and then state the facts.

A. I have some correspondence here, dated in January of 1921 with Mr. Uhden, Chief Engineer of the Skagit River Power Company. I called on Mr. Uhden about that time out here in Seattle.

Q. You say that he was the engineer of the Power Company; is that what you said?

A. Chief engineer of the project for the city of Seattle, I mean. [86]

(Testimony of H. B. Kirkland.)

Q. And what representations did you make to him and he to you, briefly?

A. Well, I told him about the pneumatic method and of its advantages for tunnel work such as sealing the rock tightly and making unnecessary a good deal of grouting that is ordinarily done, and show him pictures of the use of the machine, and urged him to use it on the Skagit Tunnel.

Q. How did you first learn of the Skagit River project? By a communication of Mr. Uhden to you or in some other way?

A. He wrote us asking for information. He sent us a copy of the cross-section of the tunnel.

Q. Do you have the correspondence here which passed between him and you or your company?

A. Yes, sir.

Q. That was in about 1921? A. Yes, sir.

Q. Now, do you know whether the correspondence and your personal visit and representations to Mr. Uhden led to the specification of the use of the pneumatic method of the McMichael patent or any pneumatic method in the lining of this Skagit River Tunnel? A. Yes, sir.

Mr. TOWNSEND.—I object to this as incompetent, irrelevant and immaterial.

The COURT.—What is the object of this?

Mr. WILLIAMS.—I want to show that it was at the instance of this plaintiff that the city and the engineers became interested in this pneumatic placement and the answer to that will show that they specified [87] that it should be used on the

(Testimony of H. B. Kirkland.)

job and then the contracts were let to R. C. Storrie & Company, and they used a method which we say is the infringing method.

The COURT.—That is the only question, whether it was an infringing method or not. That is the only question, and how they came to use it is immaterial. Objection sustained.

Mr. WILLIAMS.—Exception. I should like to have noted.

Q. What, approximately, is the weight of a cubic yard of concrete? A. About two tons

Q. Are you familiar with the use of this McMichael apparatus and method in the lining of the Twin Peaks Tunnel at San Francisco?

A. I know of it.

Mr. TOWNSEND.—I object to that as immaterial. It has been gone into by the previous witness. There is no charge that that is an infringement.

The COURT.—How is that?

Mr. TOWNSEND.—There is no charge that the Twin Peak work is an infringement.

Mr. WILLIAMS—Well, I grant you that that particular question was an immaterial one I will ask another, if I may.

Q. How far has concrete to your knowledge been conveyed through the duct or conduit of the McMichael *apparature* commercially and as feasibly practiced?

A. 4,900 feet, I understand in the Twin Peaks Tunnel in San Francisco.

(Testimony of H. B. Kirkland.)

Q. What is the highest elevation to which concrete has been carried by the use of this mechanical apparatus and method, as far as you know?

A. 105 cubic feet is the highest that we have had— [88]

Q. (Interrupting) 105 cubic feet?

A. 105 feet, rather, is the highest that we have had any occasion to shoot it.

Q. In the use of this McMichael apparatus—let me ask you first, have you operated this apparatus yourself? A. Yes, sir.

Q. And have you taught other people how to do it? A. Yes, sir.

Q. And you know how it operates?

A. Yes, sir.

Q. Let me ask you whether or not the proper mixture of the ingredients of the concrete as made in the chamber of this apparatus is fully preserved through its passage and discharge into the form where it is to be set? A. Yes, sir.

Q. Is there any separation of the cement or the sand from the rock in an objectionable manner or degree? A. No, sir.

Q. How long does it take to discharge a batch of concrete materials from the chamber of this McMichael apparatus?

A. It is just a matter of seconds. [89]

Q. How rapidly does it propel it through the conduit?

A. I think about five seconds per hundred lineal feet of pipe.

(Testimony of H. B. Kirkland.)

Q. When the concrete is conveyed through the duct or conduit of the McMichael apparatus and reaches the form or the key of a tunnel arch in which the concrete is to be set, what is the effect of the discharge of that concrete upon the concrete itself—the quality and characteristics of the concrete?

A. The concrete, weighing perhaps a ton is discharged from the end of the pipe into a tunnel form where concrete has been previously put, and discharges into the previously placed concrete with such force, going perhaps 60 miles an hour that it gives it a tremendous shock so that the whole mass will quake and it makes a very dense mixture and packs it in solidly.

Q. How does concrete thus formed by the use of this method and apparatus compare in quality with concrete formed by hand manipulation—put in place by hand and tamped by hand?

A. Concrete tamped by hand is very likely to be porous whereas pneumatic concrete is very dense and fills up the spaces against the rock much more tightly than could possibly be done by hand; also in tunnels where there is timber used, it is necessary to pack in the concrete in all the vacant spaces which is impossible by hand and always shows up with the pneumatic method.

Q. How far into a form can concrete be placed or thrown by hand processes and tamped?

A. Just as far as a man can reach with a stick or shovel to tamp it with. [90]

(Testimony of H. B. Kirkland.)

Q. How far is that?

A. A few feet—three or four feet.

Q. How far can—is concrete carried from the end of the discharge duct of the McMichael apparatus to the place in the form at which it is to set?

A. About 20 feet. The end of the pipe is usually carried to within 20 feet of the rear of the forms.

Q. Is the pipe carried over the form and between the form and the rough interior of the excavated tunnel? A. Yes, sir.

Q. How far can concrete be conveyed partly through the duct and partly after it reaches the end of the duct beyond the immediate end of the form?

A. Well, the form can be any convenient length —it may be 40 and it may be 60 feet, and the pipe that discharges the concrete is carried over the top of it to within 20 feet of the back end.

Q. What has been the custom in the commercial use of this apparatus in so far as you know as to the length of form through or by which the concrete has been carried or conveyed to the point at which it is to set?

A. We have had forms 20, 40 and even 80 feet. Where the forms are short, we have them placed in several places.

Q. How far can forms project beyond the point at which the concrete is delivered if hand methods were employed? What would be the maximum?

(Testimony of H. B. Kirkland.)

A. I should say six feet.

Q. What air pressure—what degree of air pressure is commercially used in the operation of this McMichael apparatus and method?

A. From 80 to 120 pounds. [91]

Q. What is the capacity per hour—that is how many yards per hour of concrete can be handled and delivered from one of these McMichael machines in accordance with your experience with them.

A. Well, 60—about 60 yards.—That would be about 240,000 pounds.

Q. What is the diameter of the duct of conduit of this McMichael apparatus as ordinarily used in practice? A. I didn't get that.

Mr. WILLIAMS.—Read the question, please.

(Question read as follows: "Q. What is the diameter of the duct or conduit of this McMichael apparatus as ordinarily used in practice?")

A. Six or eight inches.

Q. Can you produce a sample of concrete such as is produced or that has been produced by the use of this mechanical apparatus? A. Yes, sir.

Q. Is that broken to show the texture—

A. (Interrupting.) Yes.

Q. (Interrupting.) —Of the finished concrete?

A. Yes, sir.

Q. Is that here? A. Yes, sir.

Mr. WILLIAMS.—We offer in evidence and ask that it be marked Plaintiff's Exhibit 20. Is that here somewhere? Is this what you offer?

(Testimony of H. B. Kirkland.)

A. Yes. That is New York Subway concrete.

(Whereupon piece of concrete was admitted in evidence as Plaintiff's Exhibit 20.) [92]

Q. Perhaps you had better state how you characterize the quality of the concrete exhibited by this sample.

A. That is a homogeneous mixture and is characteristic of good concrete. It is dense—that is about all dense,

Q. Impervious to moisture, is it—water flowing through it.

A. Well, not entirely. It will become damp, but it is not porous like some concrete placed by hand.

Q. Have the apparatus or the machines manufactured and leased by the plaintiff company been stamped or marked with the word "Patentee" and the date of the McMichael patent that is, February 9th, 1925? A. Yes sir.

Mr. TOWNSEND.—If they have a mark, your Honor, we would like to see it. If it is a plate, they should produce the plate.

The COURT.—Oh, I do not know. At any rate there is nothing before the Court. Proceed.

Q. Is John H. McMichael, the patentee, living?

A. Mr. McMichael died about 1919.

Q. Now, when was it that concrete came into common use—how long ago?

A. Well, I should say that the lining of tunnels with concrete came in with the making of sidewalls by concrete. Perhaps before 1900.

Q. Well, how long before?

(Testimony of H. B. Kirkland.)

A. As far back as 1880.

Q. Now, have you here in Seattle an example of the McMichael machine as manufactured and leased by the plaintiff and which is available to be exhibited to court and counsel? [93]

A. Yes, sir. It is the Starr Machinery Company in Seattle. There we have a couple of machines.

Mr. WILLIAMS.—That I hesitate to offer in evidence, your Honor. It is a mile and a half from here. It is a heavy piece of apparatus. I invite the Court and counsel to observe that this noon recess or at the conclusion of court or at any time that suits the convenience of the Court.

The COURT.—Well, not now. If the Court ever thinks that he wants to see it, it can be shown later.

Q. Let me see. You referred to the correspondence you had with Mr. Uhden, and produced that. I think I have neglected to offer it in evidence. I do offer it now, as Plaintiff's Exhibit No. 21.

Mr. TOWNSEND.—The correspondence, I understand, was rejected.

Mr. WILLIAMS.—I beg your pardon?

Mr. TOWNSEND.—You are referring to the correspondence?

Mr. WILLIAMS.—Yes.

Mr. TOWNSEND.—That was rejected on objection.

The COURT.—It has not been offered before, I do not believe.

Mr. TOWNSEND.—I object to it on the ground that it is—

The COURT.—(Interrupting.) Sustained.

Mr. WILLIAMS.—Exception I would like, your Honor.

The COURT.—Anything further with this witness? If not, you may cross-examine.

Mr. WILLIAMS.—I have another question, I think.

The COURT.—Bring it forward, counsel. [94]

Mr. WILLIAMS.—I would like to have marked for identification merely these letters which we have offered to put in evidence and as to which the Court has sustained the objection of counsel. I understand that they do not go in evidence. I would like, however, to have them marked for identification.

The COURT.—That can be done.

Mr. WILLIAMS.—As exhibit 21 that would be. And that I should like to have done also with the photographs in the book, or the book of photographs. That would be marked for identification Plaintiff's Exhibit 18.

The COURT.—That may be done.

(Whereupon correspondence between the plaintiff company and Mr. Uhden was marked for identification Plaintiff's Exhibit 21 and denied in evidence and book of photographs was marked Plain-

(Testimony of H. B. Kirkland.)

tiff's Exhibit 18 for identification and denied in evidence.)

Mr. WILLIAMS.—That is all now.

Cross-examination.

(By Mr. TOWNSEND.)

Q. Mr. Kirkland, who prepared this list marked Plaintiff's Exhibit 19 of alleged jobs on which your apparatus was used? A. I did.

Q. Did you notice that there were a great many duplications on there?

A. I went through our files to get the names of jobs that we had done and I did probably get some duplications.

Q. I call your attention and the attention of the Court [95] to the fact that all these that are marked with a pencil check appear in duplicate. In other words, the same job is mentioned twice?

A. Yes, sir.

Q. Did you have any object in duplicating it—making the list appearing longer?

A. I didn't know that it had been duplicated.

Q. Now, do you recall any objections that the alleged users made to the use of concrete placed by the so-called McMichael method and difficulties that these users were caused? A. Yes, sir.

Q. Yes.

A. Everybody has troubles occasionally at the beginning—learning to use the pneumatic method.

Q. So this list does not represent a contented

(Testimony of H. B. Kirkland.)

lot of users or one of those from whom no objection was received?

A. After they had become acquainted with the use of the machine they had no objections.

Q. Do you recall the use in the Pennsylvania Tunnel and their experience with it?

A. No, sir.

Q. That within the last year or two or so—comparatively recently they had to expend a hundred thousand dollars in going over the work that was supposed to be done by the so-called McMichael method or gun?

A. I do not know about any such thing.

Q. You haven't heard of that? A. No, sir.

Q. Have you heard of any trouble from the Southern Pacific? [96]

A. No, sir. They are using it now.

Q. What is the character of gun that they are using? What style?

A. They are using the vertical type.

Q. Do you know that of your own knowledge or just from reports that are coming to you?

A. From reports that I have received.

Q. Merely hearsay?

(Witness does not answer.)

Q. You said that the passing of concrete or material through the pipe was approximately 100 feet every five seconds? A. Yes, sir, approximately.

Q. What measurements have you made to determine velocities in any instance?

(Testimony of H. B. Kirkland.)

A. That estimate is by observation although we have since made measurements that will accurately determine the velocity.

Q. What was the observation you referred to, visual or what? A. Visual.

Q. At what point?

A. At various points along the delivery path.

Q. How would you observe the operation inside of an iron pipe that was opaque?

A. By listening to the slugs going through.

Q. You base it then partly upon your sense of hearing? A. Yes, sir.

Q. It was largely a matter of guess as to how fast it was going, wasn't it? [97]

A. Well, you can guess it pretty approximately.

Q. You said that one of the desirable features of the use of the so-called McMichael gun in placing concrete in tunnels and against forms was the velocity or the violence of the discharge?

A. Yes, sir.

Q. Do I understand you correctly?

A. Yes, sir.

Q. And that that violent discharge gave a compacted product at the deposit point? A. Yes, sir.

Q. Now, if you were to discharge some other material at equal velocity or of equal density by compressed air would you get that same compactness? A. If it was of equal density.

Q. Of equal velocity—of equal density and with equal velocity?

(Testimony of H. B. Kirkland.)

A. And the material had the same velocity, certainly.

Q. So that blowing any material through a pipe where the velocity was the same—strike that out. What proportions of sand, cement and rock or gravel and water do you recommend for use in your machine?

A. Well, any proportion that aggregates cement, rock and water will be carried through the machine and discharged through it.

Q. Any proportion of the rock, do you mean or any of the ingredients?

A. Any proportions of the ingredients.

Q. Any proportion of the given ingredients?

A. Yes, except the discharge of rock alone. That would [98] not be successful.

Q. Rock alone would not be concrete? A. No.

Q. But it would go through your apparatus, would it?

A. Rock alone might cause trouble in getting through.

Q. Well, assume that we have water with it. I did not intend to blow dry rock.

A. Even with water it might cause trouble.

Q. Sand and water would blow through your apparatus, too, would it not?

Mr. WILLIAMS.—I object, your Honor, to these questions which are not germane to the direct and they are rather speculative. They are not germane and not material to what would happen.

(Testimony of H. B. Kirkland.)

Mr. TOWNSEND.—It is a matter of proportion. Here is the plaintiff's own engineer. We would like to know what his machine would handle and what material it is adapted for.

Mr. WILLIAMS.—The question is whether it would do these things and not whether it does.

The COURT.—He has been telling us with what speed it moves. I think you can ask him what proportions it will handle. Read the question.

(Whereupon question was read as follows: "Q. Sand and water would blow through your apparatus too, would it not?")

A. Yes.

Q. Sand and cement too would blow through, mixed with water, would it not?

Mr. WILLIAMS.—I make the same objection. [99]

The COURT.—Objection overruled.

A. Yes, sir.

Q. And cement and water in mobile proportion would also blow through the machine, would it not?

Mr. WILLIAMS.—Same objection.

The COURT.—He may answer. I think those are all obvious.

A. Yes, sir.

Q. Taking the mixture which you call concrete and which you say can be mixed in any proportion with respect to any ingredient—what effect has cement upon the mixture. Does it retard the flow or facilitate its flow?

(Testimony of H. B. Kirkland.)

A. It does not flow through the pipe. It is forced through by pressure.

Q. I beg your pardon?

A. It does not flow through the pipe. It is forced through by pressure.

Q. Well, blown through, isn't it?

A. Well, not like a stream. It is forced through by the expansion of the air.

Q. I am speaking about its traveling through.

A. Yes, sir.

Q. In that sense I used the word "flow" like blowing or traversing, or whatever it is. Does the cement facilitate its movement or retard its movement?

A. I do not think that I would want to say that it would retard it. I am not sure that it does. I guess it might.

Q. Well, isn't it a fact that a certain amount of cement [100] is a lubricant to the movement of the mixture through the pipe?

A. Well, putting lime into it makes it more of a lubricant.

Q. Then that would make it more so?

A. Yes, sir.

Q. The addition of lime? A. Yes, sir.

Q. Speaking, however, of cement that is added to the rock and sand and water—cement has a lubricating effect of some degree, has it not?

A. I should say so.

Q. Will you be good enough, by reference to

(Testimony of H. B. Kirkland.)

Plaintiff's Exhibit 17–B, show to the Court where the air comes into the receptacle?

A. In this machine there are four air ports at the top and one at the bottom at the heel of the discharge elbow.

Q. Will you be good enough to mark with the Court's permission the air port at the top with the letter "A" and a lead arrow?

A. (Witness marks same.) That is "A" and here is the—looking down at the machine shows "A" here, and "A" here, and "A" here, and "A" here (indicating). All machines are connected up in that way.

Q. Now, will you be good enough to indicate the lower air line by the letter "B"?

A. This is it (indicates and marks).

Q. Now, the pipe that I am pointing to, mark that "C," and tell us what that is.

A. That pipe line is the air supply line for the lower [101] inlet.

Q. Is that what you might call a siphon jet, or an injected jet through "C" to point "D"?

A. It is a pressure jet.

Q. And that blows directly into the outlet pipe?

A. Yes, sir.

Q. Will you mark the outlet pipe by the letter "D"?

(Witness marks same.)

Q. Now, in this photograph of the so-called commercial machine, Exhibit 16, will you indicate by lead arrows where the pipe "C–B" enters?

(Testimony of H. B. Kirkland.)

A. That is "B."

Q. Mark that "B" please and mark that "C."

(Witness marks same.)

Q. Now, in the McMichael patent where is the pipe that corresponds to "C–B"—I am showing you an enlargement of the McMichael drawing.

Mr. WILLIAMS.—I object, if the Court please, to this question on the ground that it is not germane. The witness has not testified to the details of the patent. We have a witness whom we expect to call, Mr. Ray, who is competent in a way that I am sure that Mr. Kirkland is not, to answer such question.

The COURT.—I suppose the patent shows all these things for itself and I do not know where it would better the case any to have the witness point out where the pipe is on the patent.

Mr. TOWNSEND.—I do not want to encroach upon your prerogative.

The COURT.—It is not that, but you are simply taking [102] up time uselessly.

Mr. TOWNSEND.—I just want to ask in regard to two features.

The COURT.—You introduced the drawings. You are supposed to indicate something to the Court, and I suppose the other side is entitled to cross-examination, to a limited extent. Be brief, however. Objection will be overruled. Proceed.

A. This pipe, this is the pipe that carries to the interior of the machine at the bottom.

Q. That is marked "ten" with a continuation

(Testimony of H. B. Kirkland.)

down through the body of the concrete, is that correct? A. Yes, sir. Exhibit 10 is the pipe.

Q. Yes. A. Yes.

Mr. WILLIAMS.—It shows for itself.

The COURT.—Yes, undoubtedly.

Mr. LOFTUS.—He has been testifying about this McMichael apparatus and what it will do, and it is competent to show what that apparatus was and how it compared with the McMichael drawings.

The COURT.—It shows for itself and the drawings show for themselves. Proceed, Counsel.

Q. In your so-called commercial machine as shown either in Exhibit 16 or 17–A or 17–B here you have this—you have this "24" that appears in the McMichael patent.

A. We occasionally use that when a machine is sunk in a pit.

Q. That is not my question. Does that appear in these drawings, 17–B or 17–A or in the photograph 16? [103] A. That is the discharge pipe.

Q. You have no traps, 24, or "U" bend shown in either of these so-called McMichael structures?

The COURT.—Well, he said so, and they show for themselves.

Q. Now, here is an enlargement. Does this correctly represent that so-called McMichael machine?

A. Yes, sir.

Q. Which is the structure you use to-day.

A. Both of them are used to-day.

Q. The Ransome Concrete Machinery Company, is that your licensee? A. Yes, sir.

(Testimony of H. B. Kirkland.)

Q. And both of these machines according to your understanding, come within the McMichael patent?

A. Yes, sir.

Mr. TOWNSEND.—I offer this enlargement as Defendant's Exhibit "A" for Identification.

The COURT.—We will have one series of exhibit numbers. What is the next number?

Mr. TOWNSEND.—May I give it the number that will follow my deposition exhibits and call it 133?

The COURT.—Yes, you may.

(Whereupon enlargements of McMichael machine admitted in evidence as Defendant's Exhibit 133.)

Redirect Examination.

When in the use of a vertical McMichael machine which is quite high, it is difficult to raise the concrete up to the top of it and dump it into the machine, we dig a pit and sink the machine down into so that the top of the machine will come at a convenient height for dumping the materials into it. In that case have to have the "U" bend to carry the discharge [104] out of the pit and on through to its destination. The "U" bend is still used under these circumstances.

(Whereupon an adjournment was taken at 12:00 o'clock to 2:00 o'clock of the same day.)

September 13, 1927, 2:00 P. M.

Court convened pursuant to adjournment.

All parties present.

TESTIMONY OF ARTHUR P. ROBINSON, FOR PLAINTIFF.

ARTHUR P. ROBINSON, plaintiff's witness.

My name is Arthur P. Robinson. I am 40 years old. I reside at Plainfield, New Jersey, and I am sales manager of the Ransome Concrete Machinery Company.

I heard the examination this morning of one of the witnesses, during which examination reference was made on cross-examination to the pneumatic concrete placing machines manufactured by the Ransome Company under the license of the Concrete Mixing & Conveying Company. The company with which I am connected is that Ransome Company.

I produce an illustration of the commercial machine put out by the Ransome Concrete Machinery Company under its license. This illustration is a photograph. It shows a small 7′ machine.

Mr. WILLIAMS.—That we offer in evidence and ask that it be marked Plaintiff's Exhibit 22.

Mr. TOWNSEND.—I object to that as incompetent, irrelevant and immaterial.

The COURT.—What is the object of that? Have you got that in already, Counsel?

Mr. WILLIAMS.—It is a somewhat different machine. This is a horizontal form of the machine. What we have put in thus far is the vertical type. [105]

(Testimony of Arthur P. Robinson.)

(The photograph showing the small 7′ horizontal machine was admitted in evidence as Plaintiff's Exhibit No. 22.)

I also submit a blue-print of the same 7′ horizontal machine.

(The blue-print of the 7′ horizontal machine was admitted in evidence as Plaintiff's Exhibit No. 23.)

I produce a photograph of the larger machine and also a drawing of the larger machine. [106]

(The photograph of the larger McMichael type machine of the Ransome Company was admitted in evidence as Plaintiff's Exhibit No. 24, and the blue-print of the same machine was admitted in evidence as Plaintiff's Exhibit No. 25.)

Q. Mr. Robinson, now in what way does the Ransome Company put out these machines?

A. We lease them.

Q. To whom? A. To contractors.

Q. For what kind of work?

A. Mainly for lining of tunnels and subways.

Q. Can you name some of the tunnel jobs on which you have used or on which you have leased these machines under this license?

A. Sebago Lake, Maine, water tunnel; Boston Revere Beach Railroad, Boston; East Boston Railroad tunnel; special work on various New York subway jobs; four now working on Philadelphia store tunnels; three working on the Illinois Central tunnel Ozark Mountains in Illinois; four working on the power development at Calderwood, Tenn. I believe we have now working under lease

(Testimony of Arthur P. Robinson.)

that have not been returned in the United States twenty-seven.

Q. Do you have a complete list of those jobs here?

A. Yes, sir, I have.

Q. That you can submit? A. Yes, sir.

Q. Will you produce it, and we offer that in evidence and ask that it be admitted in evidence as Plaintiff's Exhibit 26.

(The list of jobs on which the McMichael type machine of the Ransome Company was used was admitted in evidence as Plaintiff's Exhibit No. 26.) [107]

I have been connected with the Ransome Company directly since 1915 and indirectly since 1909. I am familiar with the manufacturers of concrete mixing and handling machinery, and know who they are.

Q. Who are some of these prominent concerns engaged in that business?

A. Kerr & Company, Milwaukee; T. L. Smith & Company, Milwaukee; Chain Belt Company, Milwaukee; The Lakewood Company, Cleveland; Construction Machinery Company, Waterloo, Iowa, and the Yeager Company of Columbus, Ohio.

The COURT.—That is enough.

Q. Have these or other manufacturers of such machinery and regularly engaged in the business of making and selling concrete mixing and handling machinery, sold or leased machines for the pneumatic conveyance of concrete? A. No, sir.

Q. I beg your pardon? A. No, sir.

(Testimony of Arthur P. Robinson.)

Q. Have all of these concerns, in so far as you are aware, respected the McMichael patent in suit?

A. Yes, sir.

Mr. TOWNSEND.—That is objected to as incompetent, irrelevant and immaterial.

The COURT.—Sustained.

Q. Do you have available here a sample of these McMichael machines put out by the Ransome Company?

A. There is one in the warehouse or store of the Star Machinery Company.

Q. Where is that?

A. Seventeen hundred and something First Avenue South here in Seattle. [108]

Mr. WILLIAMS.—We offer to make an inspection of that machine available to Court and counsel during or after the trial. That is all.

The COURT.—Cross-examine.

Cross-examination.

(By Mr. TOWNSEND.)

Q. Are both of these machines which are represented in those photographs, Plaintiff's Exhibit 22 and Plaintiff's Exhibit 24 screw driven?

A. No. They are motor driven.

Q. Do you have a screw in each of those types of machines?

A. Yes, sir. The blue-print shows that distinctly.

Q. The screw is shown there? A. Yes, sir.

Q. Isn't it a fact that you have abandoned the use of the screw? A. No, sir.

(Testimony of Arthur P. Robinson.)

Q. Isn't it a fact that the screw was proved a failure? A. No, sir.

Q. And that you are now using the Hackley construction? A. No, sir.

Q. Isn't it a fact that you are now infringing the Hackley patent?

Mr. WILLIAMS.—I object as calling for a conclusion.

The COURT.—Sustained.

Q. Isn't it a fact that these two machines have proven a failure on at least one job here in the West?

A. It would not say that they have proved a failure. They completed the job of that. They did not use the screw, if that is what you mean. They took the screw out. [109]

Q. They took the screw out? A. Yes, sir.

Q. What did they do?

A. They put an air jet in the back.

Q. They put an air jet in the bottom and blew it longitudinally in the bottom of the cement container?

A. I couldn't tell you where they put the air jets. They put it in the back so that they blow it forward, yes, sir.

Q. Was that the Cascade job?

A. That was the Grant Smith job at Selah.

Q. Do you use the vertical gun now or sell it at the present time?

A. I don't believe that we have any out in opera-

(Testimony of Arthur P. Robinson.)

tion. We have some at the plant and we have put some out, yes, sir.

Q. You have supplanted all your so-called vertical guns with horizontal guns, haven't you, of the type of Exhibit 22 and 24?

A. We are putting out almost entirely the horizontal type of gun, yes, sir.

Q. Referring to Exhibit drawing No. 25 representing the large type of gun? A. Yes, sir.

Q. What is the capacity of that gun?

A. Fourteen cubic feet of mixed concrete.

Q. Now, when the screw was taken out in this gun where were the air jets placed?

A. I don't know. I wasn't on that job.

Mr. TOWNSEND.—That is all. [110]

Redirect Examination.

By Mr. WILLIAMS.—What is the reason, Mr. Robinson, why you are now largely supplying the horizontal type of gun rather than the vertical type?

Mr. TOWNSEND.—Objected to for the reason that it is of no importance.

The COURT.—Well, you brought it out.

Mr. TOWNSEND.—Oh, very well.

The COURT.—I do not think it is, but you brought it out in the first instance. He may answer.

A. What was the question again?

(Question read as follows:)

Q. What is the reason, Mr. Robinson, why you are now largely supplying the horizontal type of gun rather than the vertical type?

(Testimony of Arthur P. Robinson.)

A. Two reasons—three reasons, I would say. First, we get a smaller air consumption than we got with the vertical type of gun; secondly, we practically do away entirely with the tendency of blocking due to the even speed; and third there is a very considerable saving in the overall height. The recent practice is that the machines follow the forms and in small tunnels you cannot get the vertical machine in.

Mr. WILLIAMS.—That is all.

The COURT.—Call your next witness.

Mr. TOWNSEND.—Approximate the date, please, when you went to the horizontal type?

A. I think I have got it on the back of here, but I am not sure. I would say in 1925. [111]

TESTIMONY OF O. R. BROCK, FOR PLAINTIFF.

O. R. BROCK, plaintiff's witness.

My name is O. R. Brock. My age is 47, and I reside in Seattle at 619–12th Avenue. My occupation is mining and concreting in tunnels. In 1923 or thereabouts I was employed by R. C. Storrie Company, the defendant here. I was engaged in concrete work as a foreman. I had charge of the concrete work at nights. I did not operate any concrete placing apparatus that was used in lining the Skagit tunnel, but I had men working for me who did this work. I saw the placing machines that were there used. My duties were to give my

(Testimony of O. R. Brock.)

men orders to go ahead and build the forms and get the concrete in from the outside of the tunnel into the mixers. The operation of the concrete placing machines came under my supervision, and I learned what the construction of those machines was.

Q. Will you describe those machines?

A. Those machines?

Q. Yes.

A. Well, I would describe those machines—which way do you mean—the way they were working or operated?

Q. No. Can you describe how they were made, in a general way? A. How they were made?

Q. Yes.

A. Well, they were made from steel and kind of shaped—I think they were sixteen feet long and a filling on top where we put the concrete in there and we had manifolds with air where we got the concrete out of the gun. We had four walls and an eight-inch pipe where the air put the concrete through the pipe and [112] replaced it behind the forms.

Q. Do you know where the pipes led to?

A. Yes, sir.

Q. This chamber that you speak of?

A. Yes, sir.

Q. And where the conduit left it and so on?

A. Yes, sir.

Q. Will you look—have you looked at this drawing before you took the witness-stand?

(Testimony of O. R. Brock.)

A. I was over here and looked at it. Yes, that is the same thing. (Looking at drawing.) That is the machine we had.

Q. Now, on this drawing there are some marks in red. A. That was left out on the drawing.

Q. Did you put them there?

A. I put them there myself.

Q. Will you state whether or not this drawing with the representation in red at 27-A correctly shows one of the machines which was used on this Skagit tunnel job and which was operated under your direction as foreman for R. C. Storrie & Company?

A. Yes, sir, that is correct. The way it stands there, it is correct.

Q. It is hard to hear you.

A. The way the print is there—the way the print is drawn, that is the way that the machine was in operation—the way that we operated it. All those pipes. The way that she is right now.

Q. Now, do you know whether—

A. (Interrupting.) There was no change made.

Q. Do you know whether in the first of those machines [113] there was a pipe that went into the chamber at 29, as shown on this drawing?

Mr. TOWNSEND.—I object to that as leading, your Honor.

The COURT.—Oh, it is, but then he may answer. Overruled.

A. Yes, sir.

Q. Was that pipe used or was it not used?

(Testimony of O. R. Brock.)

A. It was not used.

Q. These other pipes, as shown on this drawing, and terminating at 25–A and another at 26–A and another at 27–A, as shown in red, does that correspond or does it not correspond with the terminals of the pipe as used in the actual machines?

A. Yes, sir; just exactly.

Mr. WILLIAMS.—We offer now this drawing as identified by this witness and ask that it be marked Plaintiff's Exhibit 13. The drawing to be taken as containing the representation in red at 27–A.

(Whereupon drawing marked previously Plaintiff's Exhibit 13 for identification was admitted in evidence as Plaintiff's Exhibit 13.)

Cross-examination.

(By Mr. TOWNSEND.)

Q. You spoke of putting concrete into the chamber of this machine. Where was that put in?

A. On the Skagit tunnel.

Q. How? A. On the Skagit tunnel. [114]

Q. No, I mean where were the concrete materials put into the chamber of this placing machine?

A. Right in the center of the gun.

Q. The center? A. Yes, sir.

Q. The center of the top shown here on this drawing? A. The center of the top of the gun.

Q. What kind of concrete was it that was put in there? A. It was dry concrete?

Q. Dry concrete? A. Yes, sir.

(Testimony of O. R. Brock.)

Redirect Examination.

Mr. WILLIAMS.—What do you mean by dry concrete?

A. By dry concrete, that means medium concrete; not too wet and not too dry.

Recross-examination.

(By Mr. TOWNSEND.)

Q. What is the consistency in proportion to the material?

A. Well, I cannot tell you. I cannot tell you that. That was the city inspector—it was the city inspector's duty to do that.

Q. It was not your duty to attend to the mixture, there?

A. The inspector would tell me when it was too wet and when it was too dry, and I had to go out to the mixer and mix it.

Q. Isn't it a fact that your connection came after the concrete placing had been finished by Mr. Hackley?

A. What was that question? I cannot hear very good.

Q. Your work came after Mr. Hackley had finished his pneumatic placing? [115]

A. Yes, sir.

Q. And you had nothing to do with the placing. Your connection was only in placing the floors, was it not, on the concrete work?

A. The concrete work.

(Testimony of O. R. Brock.)

Q. And in placing the floors the gun was not used?

A. In placing the floors the gun was not used; no.

Q. Did you ever hear the concrete coming out of the gun at the discharge end? A. I did.

Q. How did it come out?

A. It came out through the eight-inch pipe, through an apron and the concrete—a concrete strip on both sides.

Q. It flowed down gently like over both sides?

A. Yes, sir.

Mr. TOWNSEND.—That is all.

Redirect Examination.

(By Mr. WILLIAMS.)

Q. I don't understand you, Mr. Brock. You seem to have described the concrete coming out of this pneumatic gun. A. Yes, sir.

Q. You saw that, did you? A. Yes, sir.

Q. And were you in and about the work at the time that this gun was in operation?

A. I was in there all night; coming in and out.

Q. Well, was the pneumatic gun shown on this drawing in use on the work while you were there employed? A. Yes, sir. [116]

Mr. WILLIAMS.—That is all.

The COURT.—Just a minute. I do not understand either.

Mr. WILLIAMS.—I did not.

The COURT.—Was your work nothing but laying the floors or in connection with the floors?

(Testimony of O. R. Brock.)

A. I had the laying of the floors and also the arches of the tunnel with the gun—gun work.

The COURT.—You worked both without and with the gun?

A. The tunnels with the gun and the floor without the gun.

Mr. TOWNSEND.—The floor was done last?

A. The floor was done last.

The COURT.—Any further questions?

Mr. WILLIAMS.—I just want to make sure that this witness was on the job and the foreman in charge of the work on which this gun was used while the arch was being poured or shot by the use of this pneumatic gun which he has described. Is that right?

A. Yes, sir.

Mr. TOWNSEND.—What was the date that that was done—when you know that the arch work was being done by the gun?

A. What date we started?

Mr. TOWNSEND.—Yes.

A. When I went to work there was in February, 1924. [117]

TESTIMONY OF FREDERICK RAY, FOR PLAINTIFF.

FREDERICK RAY, plaintiff's witness.

My name is Frederick Ray. I am 48 years old. I live at Shorthills, New Jersey. I have examined the McMichael patent in suit, No. 1,127,600.

(Testimony of Frederick Ray.)

I studied mechanical engineering at Stanford University for a period of between two or three years. Later I spent about three years at Columbia University studying physics and mathematics, and I received the degree of Master of Arts in these subjects. Later I spent a term at Harvard University in the same line of work.

I was occupied as a draftsman, designer and engineer in San Francisco for about three years. Then I was engineer in charge of the centrifugal department of the Henry R. Worthington Company of New York for three and a half years. Then chief engineer of the Alberger Pump and Condenser Company of New York for eight years and a half. Since 1915 I have been practicing as a consulting engineer and during this time I have testified in a considerable number of patent cases involving the description of patents and their operation and similar matters.

I have observed the operation of a number of pneumatic concrete transporting and placing apparatuses embodying the features of construction and operation set forth in the McMichael patent in suit.

Describing the mode of operation of the apparatus shown in the McMichael patent in suit—At 1 in the drawing is indicated a chamber in which is placed a charge of sand, rock, cement and water of the proper proportions. The chamber is then closed by the door at the top, and air pressure is admitted above

(Testimony of Frederick Ray.)

the mass of concrete in the lower portion of the chamber [118] through pipe 8, which is the source of supply, and at the same time air is admitted through pipe 10, which discharges near the bottom of the conical portion of this chamber.

The concrete tends to flow into the discharge pipe, which is marked 23, but due to its composition its flow does not extend very far before it stops. The air from pipe 11 then builds up a pressure around this discharge, cuts across the concrete at that point and blows out that particular slug of concrete which lies below it. As that slug of concrete passes out into the discharge pipe the air pressure is reduced at the discharge of the pipe 10, due to the rapid expansion of the air following the slug, and then there is a further flow from the mass above, building up another plug at the bottom of this pipe, which again is cut and blown off. So that as a result there is a plug of concrete passing in the pipe followed by a certain movement of air and then another plug comes and so on until the whole charge passes out of the chamber into the pipe and and is delivered wherever desired. After that, of course, the air then simply goes out of the pipe and the pressure is reduced and the opening at the top is opened and another charge placed in the chamber.

Mr. TOWNSEND.—I move that the answer be stricken as a misinterpretation of the patent and not a word of justification for the construction that he put upon it of slug action of any sort.

(Testimony of Frederick Ray.)

The COURT.—Well, let it stand. Your motion will be denied. If not competent testimony, why the Court will disregard it. Proceed.

Over objection that no proper foundation was laid, the witness testified.

WITNESS.—Properly mixed concrete forming materials do not have the quality of flowing as do liquids. Due to the composition [119] of such a mixture containing the large amount of irregularly shaped stones which are capable of arching over any given opening or compacting in any given pipe, the ordinary laws pertaining to liquids are no longer obeyed.

I heard the testimony given by the other witnesses called in *prima facie* by the plaintiff, and I have examined the drawing, marked Plaintiff's Exhibit 13, which is illustrative of the apparatus used by *the defendant. I have also read the specifications* and looked at the drawings of the Hackley application for United States letters patent, and I understand them.

There are some slight differences, as to details of construction, between the structure shown in the exhibit drawings of the Hackley application and the structure shown in Plaintiff's Exhibit 13, but these slight differences in details of construction, in my opinion, would not affect the mode of operation of these two devices. The differences are in the arrangement of the air pipes; the way they are brought down to the chamber and the way they are brought into it. Those are the principal differ-

(Testimony of Frederick Ray.)

ences. The air pipes to which I refer are shown at 25–A, 26–A, 27–A and 28 on Plaintiff's Exhibit 13. In the device of the Hackley patent application drawing, the pipes terminate in substantially the same places. The difference between the structure shown in Plaintiff's Exhibit 13 and the structure shown in the Hackley patent application drawing is in the way in which the pipes lead to the terminals.

Q. Now, referring to this Plaintiff's Exhibit No. 13 drawing, and the defendant's apparatus shown. Will you describe or compare the mode of operation which you would expect such apparatus to have with the mode of operation of the apparatus disclosed in the McMichael patent in suit? [120]

Mr. TOWNSEND.—We make the same objection, lack of qualification.

The COURT.—He may answer.

WITNESS.—In my opinion the defendant's apparatus, as shown in Plaintiff's Exhibit 13, operates in identically the same way, as does the apparatus disclosed in the McMichael patent in suit. The structure shown in Exhibit 13 is a horizontal chamber with the discharge leading to one side. When that is filled or pretty well filled with concrete, the discharge opening is closed just the same as in the McMichael patent,—closed by a slug of concrete or by the concrete flowing into the discharge pipe a slight distance. Any air that is admitted at point 27–A or 28–A or 26–A would eventually pass up through the concrete and immediately build pressure on top of the mass of concrete in this chamber,

(Testimony of Frederick Ray.)

and that pressure would tend to force the mass out toward the discharge. The air from the pipe 25–A would cut off the slug which was extending into the pipe and discharge it through the pipe, and in doing so, the pressure at that time [121] would be decreased and more concrete flow in forming another slug, etc., exactly the same as in the McMichael structure. When the concrete is pretty well blown out of this chamber, these jets 28–A, 27–A and 26 would have a tendency, by kinetic action of mere blowing, to blow the concrete somewhat—to move it somewhat toward a discharge opening. That is, a slight movement just like in the bottom of this chamber, the cross-section of which is shown, and it seems to be kind of egg-shaped so that a small, a very small amount of concrete would be sufficient to cover up the passage. In that respect these various nozzles act somewhat like gravity acts in the McMichael structure, that is, in that case the gravity causes the concrete flow all the time down to the discharge, whereas in this case when it is nearly all gone these air jets tend to push over the remaining portions.

Probably, in my opinion, all of the charge might not be discharged from the chamber, but when the next charge is put in, of course, it would be carried out.

Cross-examination.

(By Mr. TOWNSEND.)

Q. What is your occupation. You did not mention it. A. Consulting engineer.

(Testimony of Frederick Ray.)

Q. And what else?

A. That is all I am doing at the present time.

Q. Are you not a professional patent expert?

A. I testify in a great many cases.

Q. What was the last case you testified in?

A. What was the last case?

Q. Yes, the last patent case, and what did it relate to. That is what I mean. [122]

A. The last case I testified in was a case of the Lock Chain Company against the Robbins—against the Link Belt Company of Chicago, and it related to Link belts.

Q. You have been professionally retained, have you, to testify in this case for the plaintiff?

A. Yes, sir.

The COURT.—Oh, yes, or he would not be here.

Q. Referring to the McMichael patent, have you ever seen a machine precisely as shown in this photostat of the McMichael drawing, 1,127,660?

A. Not precisely in all the mechanical details as shown there. I have seen machines that had the equivalent of all of those in my opinion.

Q. In your opinion? A. Yes, sir.

Q. Have you seen one where the air pipe ten, or so-called equivalent, that you speak of, was placed inside of the conical receptacle 1 or 2?

A. No. Those have been placed on the outiside and brought in directly at the point desired.

Q. And in those machines that you saw was there this goose-neck, or trap 24?

(Testimony of Frederick Ray.)

A. I have seen some with it and some without it.

Q. Where it was without the trap in your opinion did the jet of air, ten, assuming its continuity of flow, produced this so-called slug action that you have spoken of?

A. Yes, the action was the same in all cases.

Q. How do you know?

A. By observing the operation—both by seeing it and observing the discharge and by observing pressures [123] occurring at different points.

Q. What was this observation in regard to the flow that you made, and how were these observations made?

A. Well, I have listened to the slugs passing through on many occasions. I have witnessed slugs come out of the discharge. I have made observations of the impact of these slugs. I have observed apparatus or built apparatus which shows the impact of these various slugs. I have taken gauge readings at different points—recorded gauge readings which indicated the passage of these slugs and the pressure passing through them.

Q. Have you a record of any of these gauge readings? A. I have.

Q. Where were these gauge readings placed?

A. They were placed on the chamber and at various points of the pipe-line.

Q. How do you know when you are listening to the material passing through that they are slugs and not something else, or some other form?

(Testimony of Frederick Ray.)

A. Well, I heard them passing through. Of course, from hearing that fact could not be determined exactly, but by hearing it and then observing other similar ones coming out of the discharge pipe I think that the conclusion could not be anything else.

Q. Did you record the frequency of the hearings?

A. I have done so.

Q. What frequency did the so-called slugs pass that you heard?

A. Well, the large slugs, and there are sometimes smaller ones intervening, but usually in the discharge of such a chamber there will be quite a number of good-sized slugs coming along. Those may be a second or [124] two apart—something of that order quite frequently.

Q. How fast was this material traveling through the pipe, do you know, or are you going to guess how fast it was traveling?

A. Well, I have a little more than just mere guessing. I have observed that point roughly, and I have a little other evidence from gauge readings and so on. The slugs move through pretty fast, from 50 to 100 feet a second. I do not think they always go through at the same speed. It depends on the particular slug and it depends on the pressure that you are using and the different other conditions. The length of the pipe will slow that down.

Q. Your estimate is that they went from 50 to 100 feet a second?

(Testimony of Frederick Ray.)

A. Those particular ones that I observed.

Q. And how frequently did you see them?

A. The large slugs in some instances were a second or so apart, but there were other slugs that came very much more frequently.

Q. And with what consistency in your opinion were these slugs separated from an interval of two seconds to five seconds and traveling from 50 to 100 feet a second?

A. I didn't separate them from two to five seconds. I said possibly a second. The consistency—

Q. (Interrupting.) You are just guessing at it because this is inside of iron pipe, aren't you? Now, give us your best guess as to the consistency unless you have some reason to give us some definite relation on the point.

A. I do not quite understand what you mean by the word [125] "consistency." What do you mean by that?

Q. What do you mean by the consistency of a slug. What is the consistency of a slug?

A. A slug is a portion of concrete with air on either side of it. In observing them coming out quite a number of the slugs may come together.

Q. Any air intermingled with the material constituting the so-called slug in your opinion?

A. Not to any great extent in my opinion.

Q. Do you know anything about the losses of friction—losses of moving concrete in a pipe?

A. Yes, sir.

(Testimony of Frederick Ray.)

Q. What do you suppose to be the friction of a slug, the length that you speak of, in a pipe, and particularly where there is an elevation connected with it?

A. Well, the elevation in the first place has not much to do with the friction, but neglecting that point the resistance required to move some slugs took an air pressure of from ten to fifteen pounds on the base of the slug. That will give you an idea of the frictional resistance.

Q. In your opinion a slug of this length could be moved by air pressure by pushing from behind when there was no air commingled with the slug mass? A. Yes, sir.

Q. That is your opinion? A. Yes, sir.

Q. Now what is the function of pipe 8 in the McMichael patent?

A. That particular pipe conducts the air to the top of the chamber above the concrete within it.

Q. What is the function of the pipe 10 in your opinion? [126]

A. The function of the pipe 10 is to cut off slugs at the bottom of the chamber and to push them out through the pipe.

Q. The functions of pipes 8 and 10 are alike, or are they different? A. They are different.

Q. In your opinion the pipe 8 has one function which is not performed by pipe 10, is that true?

A. It is not when the pipe 8 is present. If the pipe 8 is present then the pipe 10 performs both functions.

(Testimony of Frederick Ray.)

Q. But in your opinion the pipe 10 has a function which is not performed by pipe 8? A. Oh, yes.

Q. Is that true?

A. Oh, yes. There is no question about that.

Q. Now, assume that the receptable part of the McMichael machine is filled with water, what would be the action in that case? Would it work in the first place. Would it blow the water out of the pipe?

Mr. WILLIAMS.—I object to that as being wholly immaterial and not a germane question.

The COURT.—I think so. Objection sustained.

Mr. TOWNSEND.—I am leading up. I think it is important because they have constructed a fanciful theory here and we must meet it if we do not want to have any misunderstanding.

Mr. WILLIAMS.—They will have their witnesses. It is not germane.

Mr. TOWNSEND.—I won't take but a moment.

The COURT.—I do not see how there can be much controversy in this case. It appears that you are using the same thing. [127]

Mr. TOWNSEND.—We are blowing concrete.

The COURT.—By this method of air compression which gets the slugs out.

Mr. TOWNSEND.—We do not have any slug action.

The COURT.—He can answer the question. Be brief with it.

A. The water would be blown out, of course.

(Testimony of Frederick Ray.)

Q. If you were blowing water out would you have slugs?

Mr. WILLIAMS.—I make the same objection. I think it it not germane and it is immaterial.

The COURT.—I cannot see myself where this leads to something that is germane. However, I will overrule the objection.

A. Well, you might under some conditions and you would not under other conditions.

Q. If you had sand and water mixed would you have a slug action?

Mr. WILLIAMS.—I make the same objection.

The COURT.—It goes to the witness' qualifications. Overruled.

A. Sand and water mixed of the proper consistency would in some instances give slug action and in other instances it could be flowed out without it.

Q. You mean have a continuous flow?

A. Yes, sir.

Q. Would you say the same if you had a consistency of sand and water which would flow?

A. It would flow like water if it flows like water.

Q. Well, if it would flow through the pipe?

A. Then it would flow like water, which would be a liquid.

Q. If it was blown through the pipe? I am not trying to [128] be technical.

A. It would be like a liquid if blown through.

Q. If cement and water would be acted upon in any desired consistency you desired to specify,

(Testimony of Frederick Ray.)

would you have a slug action with such a mixture, operating the way that you have described?

A. Well, that is possible under certain conditions and under other conditions there would not be such an action. Of course, it seems to me that your question leads to the consideration of cement all the way from perfectly dry cement to what is the equivalent of a perfect liquid.

Q. I am speaking of a cement mixture which could be blown through the pipe.

Mr. WILLIAMS.—Dry or wet.

Q. Oh, no, I am speaking of wet mixtures.

A. You mean that it would flow through the pipe like a liquid?

Q. It would flow through the pipe like a liquid or be that consistency of concerte as you would term it.

A. Well, if it would flow through the pipe like a liquid, under certain conditions it would be possible to get a slug action and under other conditions, depending on the pipe arrangement and other things, it would flow out in a continuous stream. It would be possible to cause it to flow out of such apparatus.

Q. Now, when you have an apparatus—just a minute, I want to get a drawing please. Now, I call your attention to Plaintiff's Exhibit 17–B, alleged to be one of the commercial structures built by it or its licensees. You understand that in this structure the pipe C carries air from a point exterior of the [129] receptacle down to an elbow

(Testimony of Frederick Ray.)

and blows it into the discharge pipe. You understand that construction? A. Yes.

Q. Assuming the air to be on at the time in C, and a suitable pressure, would you have a slug action there? A. What kind of material?

Q. Any kind of material. Choose your own material, sand, water and concrete—sand and water, sand and cement—anything.

A. Well, we put concrete—with the usual concrete mixture there would be a slug action, with water there might be a slug action and there might not, depending on the discharge pipe and various conditions. And that would be true of all intermediate mixtures.

Q. Where you have this siphon jet C, isn't it a fact that that air that is being emitted from C into that elbow and its discharge pipe is commingled with material as it comes down from the receptacle above? Supposing that it is moist and mobile enough and blowing out with it?

A. Not in a concrete mixture. In such a structure as you indicate—when the concrete flows into this discharge pipe at the bottom it will immediately block out that pipe and there will be pressure developed in the air jet which was not there previous to that concrete flowing down and that pressure then causes the slug to pass out. The slug moving on reduces the pressure, which causes a further flow of concrete to that point. That is exactly the way those operate. It does not matter whether you turn

(Testimony of Frederick Ray.)

on the air continuously, or whether you let the concrete in first and turn it on afterwards. They work that way and no other way. [130]

Q. That is your opinion?

A. I know that to be the fact from observation of several such machines.

Q. Based on the same test you have already given, of listening to the so-called slugs passing?

A. Based on my ability of observing the machinery.

Q. And your observation was by hearing—

A. (Interrupting.) By sight and by pressure—by gauges.

Q. Now, when you say that you heard one of these slugs passing in the McMichael machine where did you stand with respect to the machine? What distance from it?

A. Well, many places. You can hear it anywhere along the pipe. I have heard it all places along the pipe.

Q. How far have you been from the machine when you heard what you thought were the so-called slugs passing through it?

A. Possibly one hundred feet; maybe more; maybe nearer.

Q. You do not know what the operator was doing with the valves? A. Oh, yes.

Q. At the time, do you? A. Certainly I do.

Q. How do you know when you were a hundred feet away from him?

(Testimony of Frederick Ray.)

A. I could see him. And then he was carrying out instructions which I had given him in many instances.

Q. Do you know whether or not it is customary for operators when feeding one of the machines to manipulate the valves, or are the valves simply opened and the stuff blown out?

A. As a rule it is only necessary to open the valves and [131] blow them out. Sometimes when sticking occurs they blow it out.

Q. How do you know?

A. I have seen them when that occurred. I know that they do not operate them on an air level—that is, they don't play with them.

Q. Where did you stand when that took place?

A. Stood right by the machine many times when that was done.

Q. You have also stood by the machine when you have seen the manipulation of valves?

A. I have seen him close the valves and build up some pressure and open them up again with the idea, that if there was some sticking taking place,—with the idea of blowing it out. I have seen him blow it out.

Q. When he closed the valves what occurred?

A. When the air valves are closed the pressure in the receiver generally builds up.

Q. And what takes place in the pipe based on your opinion where the material is passing?

A. Well, I don't know just what you mean. Under what condition?

(Testimony of Frederick Ray.)

Q. Is the progress of the material in the pipe retarded, or what? A. When the valve is closed?

Q. When the valve is closed.

A. That again would depend on the conditions,—the amount of the charge and the amount of air in the chamber itself.

The COURT.—That is obvious to the Court.

Mr. TOWNSEND.—I think that is obvious, your Honor.

Q. Have you ever seen a Hackley machine in operation? A. A Hackley? [132]

Q. Yes.

A. Not that I know of by that name.

Q. Well, you testify in regard to a machine that is represented—alleged to be represented by this exhibit—enlargement No. 13. Have you ever seen a machine like that?

A. Not identically the same as that.

Q. You have never seen a machine like 13?

A. Not exactly the same.

Q. What do you mean by not exactly the same? In what respect, if you know, was it different?

A. I have seen horizontal machines with similar outline to that, with the discharge on the end but not with the same arrangement of air jets that are in the chamber as shown on this drawing.

Q. Have you ever seen the defendant's machine?

A. I have not.

Q. And you have never seen one operate, of course, then? A. No.

(Testimony of Frederick Ray.)

Q. Have you ever seen a machine—I am looking for a file-wrapper, Judge.

A. Possibly I have.

Q. (Continuing.) Have you ever seen a machine such as is represented here in the patent of our R. C. Hackley, of March 1st, 1927, patent No. 1,619,297?

A. I have never seen a machine identically the same as shown here.

Q. You heard the previous witnesses state, Mr. Ray, haven't you, that the pipe 29 shown on this exhibit 13 had a cap on it and air was never let into it? A. Yes, sir. [133]

Q. Now, in your opinion, assuming a machine built as shown in this Exhibit 13 and where the pipe 27–A has been corrected, as indicated in red, is it your opinion that this machine would operate the same if it had only this one pipe, say, 26–A, and omitting pipe 25–A and 27–A?

A. No, that is not my opinion.

Q. You feel that one pipe *that* would not operate the same as three?

A. I feel that pipe 25–A could not be omitted and make the thing operate satisfactorily.

Q. Assuming that you have only pipe 25–A in your opinion would the machine operate the same in principle as it does with the pipe 27–A and 26–A?

A. It will operate the same in principle. It will not operate as well in that the charge will not be moved over to the discharge pipe so well. If any means whatsoever are taken to move that charge over by slanting the machine, or by putting a piston

(Testimony of Frederick Ray.)

in or screw, then it will operate perfectly satisfactory with the pipe 25–A alone. Of course, it is essential that the charge come on over into the discharge pipe where it can be acted upon by the air from the pipe 25–A.

Witness excused.

Mr. WILLIAMS.—The plaintiff rests.

(Whereupon the plaintiff rested its case.)

The COURT.—Proceed with the defense.

DEFENDANT'S CASE.

Mr. TOWNSEND.—May it please the Court, a number of [134] depositions have been taken and they have not all yet been returned by the reporters but I have word that they are en route and those that I am not able to offer formally to-day I wish to be considered as offered and that you will bear with me in the delays that have occurred. We have been duly diligent and we have been to tremendous trouble and expense in taking these depositions, after having within three months taken the depositions originally, and where I attended myself and where counsel for the plaintiff was present, and I have had the depositions in the two other cases printed so that if your Honor wants to see them you are welcome to look at them.

The first set of depositions are the depositions taken at Sulphur, Louisiana, of the witnesses Keever and Maxwell. At this time I ask that those be formally received together with the exhibits, and the exhibits be given their number as shown there.

(Deposition of William R. Keever.)

The COURT.—(Interrupting.) The Court will read them afterwards, anyhow. Proceed, Counsel.

(Said depositions of Samuel W. Maxwell and William R. Keever were received in evidence, said depositions reading as follows:)

DEPOSITION OF WILLIAM R. KEEVER, FOR DEFENDANT.

WILLIAM KEEVER, a witness for defendant, whose deposition was taken at Sulphur, Louisiana, on August 30, 1927.

My name is William R. Keever; I am vice-president in charge of operations of the Union Sulphur Company, Sulphur Mines, Louisiana; I have been connected with the Union Sulphur Company since early in 1902, first as contractor drilling wells. From 1905 until the latter part of 1918, I was superintendent of drilling operations, and since that latter time I have been vice-president in charge of operations for the Union Sulphur [135] Company, which company's business has been the producing and marketing of sulphur.

Q. Was the Union Sulphur Company incorporated at the time you came here?

A. I am sure it was.

Q. Please describe the method of mining the sulphur used by the Union Sulphur Company at the time you came here and started to work.

A. In the first place a well was drilled the same as drilling for oil. The casing is set in the top

(Deposition of William R. Keever.)

of the lime rock for about twenty feet, then drilling is continued through that casing into the sulphur bearing arena a short distance, where another string of pipe is set. Then the drilling is continued inside of that pipe to the bottom of the sulphur deposit which constitutes the drilling operations of the well. The first string of pipe I referred to is 12½ inches; the second string is 10 inches, then an 8-inch perforated pipe is inserted from the bottom of the 10-inch pipe about in the neighborhood of twenty feet; then a combination string of 6-inch and 5-inch pipe is inserted, the 5 inch from the bottom up through the 8 inch to about ten feet above the top of the 8-inch pipe; from this on up to the top of the wall and above for about twenty feet, the 6-inch pipe extends. Inside of this the combination string of 6 and 5 inch a 3-inch pipe is inserted that extends from the bottom of the well to about six feet above the top of the 6-inch pipe. Inside of the 3-inch pipe a one-inch pipe is inserted from within twenty feet of the bottom of the 3-inch pipe. This constitutes what we term, or call, the equipment of [136] a well.

Q. Please explain what these various size pipes were for.

A. The 12½-inch pipe was a surface pipe to protect the hole while drilling and the 10-inch pipe while steaming the well. The 10-inch and the 8-inch pipes conjointly were used as conductors pipes for the hot water. The 6 and 5 inch combination string of pipes is used for hot water conductors to the

(Deposition of William R. Keever.)

bottom of the well. The 3-inch pipe is the sulphur conducting pipe. The one-inch pipe is used for conducting the air into the well.

Q. What kind of air do you refer to?

A. Compressed air.

Q. You state that comprised the drilling operations? A. Drilling and equipment.

Q. What was the next operation after the drilling and equipment of the well?

A. The next operation was the introduction of hot water through the 10-inch and 8-inch pipes and the 6 and 5 inch pipes. There were two lines leading from the battery of boilers which conveyed the hot water from the plant to the well that connected to the 10-inch pipe and the 6-inch pipe at the top. After the hot water was introduced into the well for a length of time, which varied from twelve to twenty-four hours, the well was then opened up to see if any molten sulphur was in the bottom of the well. If it was found that there was sulphur and the well sealed the air compressor was started at the air plant, and air turned into the well through the one-inch air line which was used to bring the sulphur to the surface. [137]

Q. What did you say brought the sulphur to the surface? A. The compressed air.

Q. These operations you speak of were used in the early years?

A. They were used when I came here in 1902 and have been used continuously since up until the time we shut down. I can say that, with the exception

(Deposition of William R. Keever.)

of from the middle of 1903 to the first part of 1905, when I was away.

Q. What method was used in these two years?

A. I could not say.

Q. How deep were these sulphur wells?

A. They varied from something like 500 feet to 1400 feet.

Q. At approximately what depth below the surface of the ground was the sulphur found?

A. Well, it was found at a depth of from 500 to 1400 feet.

Q. Was any sulphur produced by the method described from the 1400 feet depth? A. There was.

Q. Please describe what formation was found in the drilling of these wells.

A. Well, from the surface to what we call cap rock, was composed of sand, clay and gravel.

Q. At approximately what depth is the cap rock located in the ground?

A. Well, it varies from something like 400 feet to 1100 or 1200 feet. It depends altogether on what position and locality the well was located on the deposit, or over the deposit.

Q. What was found below the cap, or lime rock?

A. Lime rock and sulphur. [138]

Q. What was found below the lime rock and sulphur? A. Gypsum.

Q. And what was found below the gypsum?

A. Anhydrite.

Q. And what was found below the anhydrite?

A. Rock salt.

(Deposition of William R. Keever.)

Q. And what was found below the rock salt?

A. I do not know. Never drilled through it.

Q. In what form did you find the sulphur?

A. Well, in some stratas it was pure sulphur, but in most of the formations it was lime rock and sulphur mixed. The lime rock is of a porous character, and the sulphur was found in the porosity of the rock. In other words, the rock was honeycombed.

Q. You testified in the case of the same plaintiff, the Concrete Mixing and Conveying Company vs. the Great Western Power Company of California, Suit No. 1804 in Equity, pending in the Northern District of California, and also in case of same plaintiff vs. the Stone & Webster Company, in Equity No. 2747, United States District Court of Massachusetts, I believe, did you not?

A. I think so.

Q. In that case I believe you drew a sketch in your own handwriting of the formations as you found them. I hand you document marked "Sulphur, La., Defendant's Exhibit #1, and ask you if that sketch was drawn by you?

By Mr. WUPPER.—Question objected to as leading.

A. It represents the sulphur deposit as I drew it.

Q. In whose hand is this document marked Exhibit 1 made? [139]

A. In my hand. I made it.

Q. What does it represent?

(Deposition of William R. Keever.)

By Mr. WUPPER.—Objected to, as the document speaks for itself.

A. It represents the condition of the sulphur mine, and the vertical lines represent the well going from the surface through the lime rock, sulphur bearing rock and gypsum. The sketch above referred to is offered and filed in evidence in the present case, and marked "Defendant's Sulphur Louisiana Exhibit No. 1."

By Mr. WUPPER.—The exhibit is objected to as being secondary, irrelevant, immaterial and not properly proven.

Q. Do you know of any publication that illustrates the formation of the sulphur dome?

A. I have seen illustrations in some publications, but I do not now remember the name of the man who made it.

Q. Mr. Keever, do you know of any suits that have been in court over the method, or process, used by the Union Sulphur Company? A. I do.

Q. Where was this suit, or suits?

A. The suit was the Union Sulphur Company vs. Freeport-Texas Company.

Q. In what court, if you know?

A. I think it was the United States Court.

Q. In what State was the case tried?

A. Most of the evidence was taken in New York, but I think the case was tried before Judge Bradford.

Q. I hand you document marked "Defendant's

(Deposition of William R. Keever.)

Sulphur, [140] Louisiana Exhibit No. 2," and ask you to state what you know about it?

A. Well, this is a drawing that illustrates the sulphur mine dome.

Q. Were you a witness in the case of Union Sulphur Company vs. Freeport-Texas Company, just referred to?

By Mr. WUPPER.—Objected to as leading.

A. I was.

Q. Defendant offers and files in evidence the document previously referred to, marked "Defendant's Sulphur, Louisiana, Exhibit No. 2."

By Mr. WUPPER.—The exhibit is objected to as incompetent, irrelevant, and not proven as to the original.

Q. Mr. Keever, is this sketch, marked "Defendant's Sulphur, Louisiana, Exhibit No. 2" a reproduction of any other sketch you know of, and have you seen it before, or the original from which it was taken?

A. I think I have seen all the sketches that were made in connection with that suit.

Q. Have you a copy of the testimony and exhibits in the suit of Union Sulphur Company vs. Freeport-Texas Company?

By Mr. WUPPER.—Objected to as leading.

A. I have.

Q. Please examine this and see if you find any sketch or exhibit in that testimony corresponding to the one marked Sulphur, Louisiana, Exhibit No. 2?

A. The sketch you are referring to is the same as

(Deposition of William R. Keever.)

the Sulphur [141] Exhibit No. 31, on page 235 of Volume 4, of the Union Sulphur Company vs. Freeport-Texas Company.

Q. Which of the sketches is the original of said suit, and where is the original of Sulphur, Exhibit No. 2, if you know?

A. It was in Volume 4 of the Union Sulphur Company vs. Freeport-Texas Company.

Q. Please refer to exhibit marked "Defendant's Sulphur, La., Exhibit No. 1," and explain how you would find the sulphur deposits at different depths.

A. Immediately over the center of the sulphur deposit the sulphur is found at less depth than it is farther out on the periphery of the dome. The deposit is in the shape of an inverted bowl, and as the well was drilled on the outer edge there was more clay and sand to go through before rock was encountered; in other wells the extent of the dome down to the rock was something like 400 or 500 feet; on the outer edge it would be from 1100 to 1200 feet to cap rock.

Q. Have you any diagram, or drawing, that would represent the method, or manner in which the pipes of the Union Sulphur Company were located in the wells?

A. I suppose we have drawings around the office.

Q. I hand you document marked "Sulphur, Louisiana, Exhibit No. 3," and ask you to examine it, and state of what it is a reproduction.

A. It is a reproduction of the equipment of a sulphur well.

(Deposition of William R. Keever.)

Q. In what manner, if any, does it differ from the equipment described by you this morning as used by the Union Sulphur Company in 1902?

A. It represents the equipment as I described it. [142]

Q. Defendant offers and files in evidence the document above referred to marked "Sulphur, Louisiana, Exhibit No. 3."

By Mr. WUPPER.—The exhibit is objected to as incompetent, being secondary and irrelevant.

Q. Will you please describe the methods used by the Union Sulphur Company when you came here in getting the sulphur to the surface, beginning with the completion of the equipment of the well?

By Mr. KING.—Strike out the question.

Q. What temperature was the water that was introduced into the well that you testified was for the purpose of liquifying the sulphur?

A. It was around 330 degrees, sometimes it being a little less than that, at other times a little higher, it depending on the steam pressure, but was usually carried around 330 degrees.

Q. What was the purpose of introducing the water into the well?

A. The purpose of introducing the hot water was to liquify the sulphur.

Q. To what density or pressure was the compressed air reduced before it was introduced into the well?

A. Well, there was no set pressure to compress the air before it was introduced into the well.

(Deposition of William R. Keever.)

Q. About what was the amount of the compression?

A. Well, it varied from 350 to 600 pounds approximate pressure.

Q. After the well was first steamed was that all the steaming [143] necessary or was it necessary to continue the steaming?

A. The steaming, or delivering of hot water into the well was a continuous operation, with very few exceptions, during the entire life of the well. There had to be something wrong with the well if the water was taken off it.

Q. What quantities of sulphur were brought to the surface by the Union Sulphur Company during the years you have been connected with them?

A. Well, it varied from year to year, and I would have to go to the records to get the production figures.

Q. Please state the quantities of sulphur brought up the surface of the ground by the Union Sulphur Company by the methods you described with compressed air, since you have been with the Company.

A. I can give this by going to the records. In 1902, 6,727 tons; in 1903, 23,715 tons; 1904, 79,187 tons; 1905, 218,950 tons; 1906, 287,590 tons; 1907, 285,882 tons; in 1908, 367,896 tons; in 1909, 270,725 tons; 1910, 246,510 tons; 1911, 204,220 tons; 1912, 786,605 tons; 1913, 478,565 tons; 1914, 374,470 tons; 1915, 379,885 tons; 1916, 383,065 tons; 1917, 595,130 tons; 1918, 918,700 tons; 1919, 526,250 tons; 1920, 37,635 tons; 1921, 795,980 tons; 1922, 1,146,860 tons.

(Deposition of William R. Keever.)

By Mr. WUPPER.—The answer is objected to as being read from the record, and not within the peculiar knowledge of the witness, and as being incompetent, irrelevant and immaterial.

Q. Up to what time did the Union Sulphur Company continue [144] to bring sulphur from the ground by compressed air? A. Up to 1924.

Q. From what record did you obtain the information just given about the quantity of the sulphur produced?

A. It was from the Union Sulphur Company's records, taken from their daily production book.

Q. What method was used to bring all this sulphur to the ground?

A. The compressed air method.

Q. What other practical method, aside from the compressed air method has been used by the Union Sulphur Company to bring sulphur to the ground?

A. There was no other practical method.

Q. Do you know of any other practical method used by any other company?

A. I do not; I know that the Freeport-Texas Company are using compressed air in their wells.

By Mr. WUPPER.—Objected to, as being hearsay evidence.

Q. Is it within your knowledge as to the methods used by the Freeport-Texas Company and the Texas Gulf Sulphur Company?

A. I have seen sulphur produced at both companies' plants, and know that they are using compressed air.

(Deposition of William R. Keever.)

Q. Is sulphur easier to convey or lift by compressed air than water, or any other substance you know of, or is it harder?

A. It is harder to convey than water because it is heavier, but if sulphur is kept at the right temperature I can see that it can be no easier or harder than other flowing substances of like density or specific gravity. [145]

Q. When you are pumping sulphur what would be the height of the surrounding column of water, would it be above or below the sulphur?

A. Well, the column of water extended to the top of the six-inch pipe.

Q. Would the liquified sulphur arise above that water, or stay below it before the compressed air forced it out?

A. It would be below before the air was turned in, then the sulphur would come up approximately one-half of the distance from the bottom as the well is deep, because sulphur is about twice the specific gravity as water.

Q. Then you would raise the sulphur by the compressed air to about what height?

A. About one-half of the distance of the depth of the well.

Q. And that would vary in feet about how much?

A. It would vary from 300 to 700 feet. Of course the air is introduced into the sulphur at the bottom of the well, practically within twenty feet of the bottom of the well, which immediately starts to lighten the column of sulphur and starts it up

(Deposition of William R. Keever.)

and lifts the sulphur more than one-half of the distance on account of it starting from the bottom of the well.

Q. Have you any photographs showing the flow of sulphur at the surface which shows the action of the compressed air?

A. We have had lots of photographs around at different times.

Q. I hand you document marked Exhibit 4, and ask you to identify it?

A. That is the photograph of a producing sulphur well.

Q. Where was that taken?

A. At the Sulphur Mines. [146]

Q. Please indicate by marking on this Sulphur Exhibit No. 4 the sulphur coming through the pipe.

Witness marks Defendant's Sulphur, La., Exhibit Number 4.

Q. How have you marked the place where the sulphur comes from the well?

A. By a cross-mark on the line coming from the discharge pipe of the well.

Q. What is coming from the pipe at the edge of the wall, apparently flowing into a wheelbarrow?

A. Water.

Q. Do you know of what well this is a photograph?

A. I am not sure, but I think it is 33.

Q. Please explain the picture, giving details of various things shown on it.

A. The black looking substance at the end of the three-inch line running down is liquid sulphur

(Deposition of William R. Keever.)

coming out of there, and is falling into a bin where it congeals; there are four small sulphur bins.

Q. What is the white looking substance in the center of the board wall?

A. Congealed sulphur.

Q. By what method was the sulphur being brought to the ground in this picture, which you say you believe is well No. 33.

A. Compressed air.

Q. When was well No. 33 drilled and steamed?

A. Well, I cannot say, but I think it was in 1902 or 1903.

Q. Could you be positive as to the outside limit?

A. Well, I would not want to say positively without referring to the record; I can do that in about one-half a [147] minute. In 1902.

By Mr. WUPPER.—The answer is objected to as not being of the best evidence.

Q. Was that well steamed and made to produce while you were working for the Union Sulphur Company? A. Yes, sir.

Q. From what record did you obtain that date?

A. From the well log record.

Q. Made by whom?

A. Well, they were made by different workmen in the employ of the company, under the direction of a drilling superintendent.

Q. What was your connection with the company in 1903? A. In 1903 I was contracting.

Q Contracting? A. Drilling wells.

Q For whom?

(Deposition of William R. Keever.)

A. The Union Sulphur Company.

Q. Where?

A. At Sulphur Mines.

Q. Defendant offers and files in evidence Sulphur, La., Exhibit No. 4.

By Mr. WUPPER.—The exhibit is objected to as irrelevant, incompetent, and not proven as to date.

Q. Please state, or describe the manner in which sulphur comes out of the well when produced by compressed air?

A. It comes out intermittently, by gushes, slugs, or pulsations. [148]

Q. About how frequently do these pulsations occur?

A. They vary from seven or eight up to twenty-eight per minute. It depends on the amount of sulphur that the well is producing.

Q. How do you explain the appearance of the sulphur shown coming from the pipe on Sulphur Exhibit No. 4?

A. At the time the photograph was taken the well was making one of its pulsations, or gushes of sulphur.

Q. Was there any difference in the way the sulphur came from the end of the pipe during the various years that the Sulphur Company operated?

A. It always came, so far as I have been able to observe, in the same way, in pulsations.

Q. Were these operations of intermittency made a point of observation on the part of yourself, or

(Deposition of William R. Keever.)

any of the officers of the company, and if so, in which particular?

A. Well, it has always been quite noticeable. It was early talked about that when a well was pumping you could always tell pretty well what a well was making approximately by the gushes per minute.

Q. What would these variations of pulsations indicate to you as a sulphur man?

A. Where a well was only making a few gushes, from ten to fifteen, it would be pumping a very small quantity of sulphur, but if it pumped up to twenty-eight gushes per minute, it would make from five to six hundred tons in twenty-four hours.

Q. Then, when the well was pumping less sulphur, the gushes would be farther apart rather than the individual gush producing less sulphur? [149]

A. They would be farther apart, and some less sulphur.

Q. About how far was the sulphur conveyed through the pipes by compressed air, after it reached the surface of the ground?

A. It varied in different localities and at different times. I would say probably from forty feet to fifteen hundred feet.

Q. Would it be conveyed up into the air as well as a distance along the ground?

A. It has been lifted, though usually came out of the well to a certain height, and would flow about same level to the bin, but we have raised it vertically and pumped and had it come down again.

(Deposition of William R. Keever.)

Q. By compressed air?

A. By compressed air.

Q. Was there any difference in the manner that the sulphur came from the end of the pipe when it discharged it into a bin immediately adjoining the well and where it was discharged fifteen hundred feet away?

A. There was no difference perceptible that you could see.

Q. I show you Volume 3 of Plaintiff's Book of Exhibits in the Sulphur-Freeport suit, page 287, and ask you to identify it?

A. It is a representation of a sulphur well discharging sulphur into a bin.

Q. What exhibit was that, and where used?

A. Exhibit No. 43, used in the patent suit of Union Sulphur Company vs. Freeport Texas Company, defendant.

Q. I hand you document marked Sulphur La. Exhibit No. 5, and ask you if that is a replica of the exhibit just [150] testified to by you as being No. 43 in Volume 3 of Plaintiff's Book of Exhibits on page 287, in the suit between the Union Sulphur Company, and the Freeport, Texas, Company?

A. It is a reproduction of Exhibit No. 43.

Q. I will ask you what this document marked Defendant's Sulphur Exhibit No. 5 is, and what it shows?

A. It is a photograph of a sulphur bin, and liquid sulphur coming out of the pipe into the bin.

Q. How do you explain the appearance of the

(Deposition of William R. Keever.)

sulphur, as it is discharged from the end of the pipe?

A. The photograph was taken during one of the gushes.

Q. What does the black substance represent at the end of the pipe?

A. Coming out of the pipe is liquid sulphur, and the large black substance below is congealed sulphur which we always find around the discharge of the well.

Q. Defendant offers and files in evidence the document marked "Defendant's Sulphur Exhibit No. 5."

By Mr. WUPPER.—The exhibit is objected to as secondary evidence, and not having been proven, there apparently having been no testimony taken as to when the original was made.

Q. From this picture could you say whether it represents the appearance of the discharge pipe of a sulphur well in 1902, or 1906–7?

A. It represents the discharge of sulphur from a well at that time, and at all other times.

Q. I hand you document marked Exhibit No. 6, and ask you to state what it represents. [151]

A. It represents a sulphur well equipped ready for operation, or already in operation.

Q. Please explain the picture, stating the use of the various attachments, pipes, etc.

A. Well, the perpendicular pipe coming out of the ground is the 12½-inch pipe; the small pipe above the 12½-inch is the six-inch pipe; the smaller

(Deposition of William R. Keever.)

pipe above the six-inch pipe is the three-inch pipe, and coming out of the top of the three-inch pipe is the one-inch pipe. The twelve and one-half inch pipe, marked No. 1, is connected to the ten-inch pipe on the inside of it, but you cannot see it in this diagram, which is used for hot-water conductor to the sulphur deposit. The six-inch pipe, marked No. 2, is used as a hot water conductor to the bottom of the sulphur well in conjunction with the five-inch that is attached to the six-inch. The six and five-inch are used conjointly in the well for water conductors. The three-inch pipe above the six-inch pipe is used as a sulphur conductor from the bottom of the well, marked "sulphur." The first string of pipe above the ground is a six-inch pipe used for conducting hot water to the twelve and one-half inch and ten-inch pipe, marked "water." The second pipe above the ground is a four-inch pipe which connects to the six-inch vertical pipe, which is used for hot water. The top line, or four inch line, leading out vertically, is the sulphur line which conveys the sulphur from the top of the three-inch, or well line, to the sulphur bin. The smaller one-inch pipe leading off horizontally is used for air line, marked "AIR." There is a one-inch line coming out of the end of the four-inch [152] sulphur line which is used as a steam line to keep the sulphur within the four-inch line from congealing, which is marked "Steam line in sulphur Line." The lumber is what is termed as scaffolding up to the top of the well, this being used to lay the different lines on and the workmen have to get out on to the top of the well.

(Deposition of William R. Keever.)

Q. What does this whole picture, marked "Sulphur Exhibit No. 6" represent?

A. It represents a well equipped with all lines ready for the production of sulphur.

Q. What difference is there between this representation marked "Sulphur Exhibit No. 6" and all other wells equipped for producing the sulphur which is used by the Union Sulphur Company?

A. It is practically the same through the whole life of the operation.

Q. Was there any difference in this equipment, as shown by Exhibit No. 6, and the equipment in use when you came to the Sulphur Mines?

A. It was practically the same equipment.

The hour of twelve o'clock having arrived, the taking of testimony was continued until one-thirty P. M. The hour of one-thirty P. M. having arrived, the testimony was continued.

(By Mr. KING.)

Q. You described this method of liquifying sulphur, and pumping it out of the ground by compressed air, to whom of this method due?

A. To Herman Frasch.

Q. I show you copies of the patents from the testimony in [153] the suit of Union Sulphur Company vs. Freeport & Texas Company, marked "Sulphur Exhibit 7-a" and also one marked "Sulphur Exhibit 7-b," "Sulphur Exhibit 7-a" being patent No. 461,429, and the one marked "Sulphur Exhibit 7-b" being No. 461,430, and ask you if

(Deposition of William R. Keever.)

the patentee in those patents is the same Herman Frasch to whom you have referred? A. Yes.

Q. These Frasch patents above referred to are offered and filed in evidence as exhibits, and marked "Sulphur Exhibits 7–a and 7–b."

Q. Mr. Keever, in speaking of the delivery of the sulphur at the surface by means of compressed air, did any water come up with that sulphur, and if so, what time?

A. There is usually a little water in advance of the first sulphur which came up, due to the water left in the sulphur pipe, and when the pipe was opened and after the well started producing sulphur there is no water as long as it produced sulphur.

Q. What would be the condition during intermediate normal pumping conditions of sulphur?

A. Almost pure sulphur. Outside of the moisture in the air I do not think there was any difference.

Q. You spoke about your pumping sulphur up to about 1924, what was the reason for discontinuing at the Sulphur Mine?

A. It became unprofitable to produce more sulphur on account of the exhaustion of the deposit of sulphur.

Q. Prior to 1907 did you know of the use of compressed air being used in conveying any other substance than sulphur, and if so, state what experience you have had with moving, [154] raising or lifting any other substance with compressed air.

A. Well, we lifted water, and we also lifted sand and gravel.

(Deposition of William R. Keever.)

Q. You speak of "we"; to whom do you refer?

A. Well, I mean the Union Sulphur Company.

Q. Where was that done and when?

A. I think it was in 1906 or 1907; I am not positive. It was done here about one-half mile north of the sulphur deposit, probably a little farther than that.

Q. What other experience have you had, or know of, lifting other substances by compressed air?

A. We also lifted mud laden water with compressed air, which we used in drilling wells. I was also shown a quantity of sand over at Crowley that came out of a well. I did not see it coming out, but the sand was there. The well was drilled by a man named Myron Abbott.

By Mr. WUPPER.—That portion of the answer relating to the sand coming out of the pump, or well, is objected to as hearsay evidence.

Q. Just describe what you saw at Crowley, with regard to the sand, etc.

A. Well, I saw a pile of sand that was probably eight feet high right around the well for about 125 feet, just a cone shaped body of sand which had been brought up out of the well.

Q. What else did you see at that place in the nature of rigging, etc.?

A. Well, there was nothing, only just the ordinary outfit to drill a well, and then there was a brick plant adjacent [155] to it.

Q. Who was in charge of the operation there?

A. I could not say who was in charge of opera-

(Deposition of William R. Keever.)

tions. Mr. Abbott told me he was a stockholder in the brick plant and I believe the brick company put down the well.

By Mr. WUPPER.—The answer is objected to as hearsay.

Q. What kind of a derrick did you say was in the center of this sand pile?

A. It was just the ordinary oil field derrick, shorter, probably a sixty-four foot derrick. I do not remember just the height of it.

Mr. WUPPER.—Objected to as hearsay.

Q. Did you see any machinery around the well?

A. I did not see any; if there had been any machinery there it would have been covered with sand, the casing came up in the center of the sand pile.

Q. Did you see any pipes?

A. I saw the well pipes that the well was cased with.

Q. Did you see any air compressor around there?

A. No.

Q. Have you had any experience, or know of any other place where sand, gravel, or other heavy material, has been moved with compressed air?

A. No. I do not recall any other.

Q. The testimony you have just given about the sand was at what place?

A. Crowley, Louisiana.

Q. Is that the same Mr. Abbott who was drilling a well for [156] the Crowley Oil & Mineral Company at Jennings?

By Mr. WUPPER.—Objected to as leading.

(Deposition of William R. Keever.)

A. The same man.

Q. Do you know of compressed air having been used in any brickyard? A. No.

Q. Now just tell about the way in which you used compressed air here at the Sulphur Mines other than for the use of lifting liquid sulphur?

A. In lifting sand and gravel a well was drilled down into the sand and gravel bed and cased with a ten-inch pipe. Then we tried flowing the sand and gravel through the ten-inch pipe with a one-inch air line inserted near the bottom of the well, and our first experience showed us there was not enough water to carry the sand and gravel out, so the one-inch air line was pulled out and a string of six-inch pipe put into the bottom of the well, and the one-inch pipe inserted inside of the six-inch and a flow of water was put down between the six-inch and a flow of water was put down between the six and ten inch pipes, and the air was introduced through the one-inch, which gave a satisfactory flow of sand, gravel and water through the six-inch. In pumping the mud laden water from the big pit for the use of drilling wells there was a four-inch pipe put down into the water and mud and the one-inch pipe put to the bottom of that, and the air turned on, and it flowed the water and mud out.

Q. What difference did you notice, if any, in the way the sand and gravel and mud laden water came through the pipe with reference to the way the sulphur came out of [157] the well into the pipe?

A. The sand and gravel and water came with a

(Deposition of William R. Keever.)

steady flow; if the mud was too dense or thick it would come for a little while in little gushes, but it would soon quit this and the water and mud would come in a steady flow.

Q. Otherwise, it would come intermittently, as the sulphur did?

A. No. It was a steady stream. All the water wells flowed steady after they started, and would keep a steady flow.

Q. In what respect did your equipment in pumping the sand and mud laden water by compressed air differ from the equipment used for pumping sulphur?

A. It was practically the same, except that the pipes used in the sand and mud operations were suspended from the top.

Q. At what depth did you pump this sand from?

A. Well, I would say something like four hundred feet.

Q. What depth did you pump the mud from?

A. It was thirty feet; the pipe was up above that, say thirty-six feet.

Q. Mr. Keever, I show you a small picture marked "Sulphur Louisiana, Defendant's Exhibit No. 8," for identification, and ask you if that illustration bears any resemblance to the sand delivery you have spoken of?

A. That is the way the flow came; water and sand and gravel out of the well; it blew straight out from it.

Q. Do you note any difference or similarity?

(Deposition of William R. Keever.)

A. It was similar in the steady flow of the water in the pipe.

Q. About how far did you deliver the sand, or blow the sand and water when you were pumping? [158]

A. I judge it would be around fifty or sixty feet.

Q. What was the size of pipe the sand was delivered in? A. Six-inch pipe.

Q. What air pressure did you use in pumping the sand?

A. Well, I think from three hundred to three hundred fifty pounds pressure.

Q. Defendant offers and files in evidence the photograph just referred to marked "Sulphur, Louisiana, Defendant's Exhibit No. 8" for identification.

Mr. WUPPER.—The photograph is objected to as immaterial, and irrelevant, not proven, and being on such a small scale as to be indistinct and illegible as to what it shows.

Q. What machinery did you use for compressing air back in 1902 and 1903.

A. We used air compressors of several different makes. We have the Ingersoll & Rand, Dunn, Laidlaw & Gordon, Hall and the Clayton.

Q. Do you remember where you got the Ingersoll compressor from?

A. I am not positive, but think we got them from the Jennings Oil Field; I think from Haywood Oil Company.

(Deposition of William R. Keever.)

Q. Who was the man who first used compressed air to produce sulphur, as far as you know?

A. Herman Frasch.

Q. And you yourself have used it since coming to the Sulphur Mines?

A. Since 1902, were using compresses air when I came here in 1902. I was here in 1902 and 1903 and saw the compressor running. [159]

Q. And you had charge of the pumping from what year? A. From 1905.

Q. Mr. Keever, did you look up to see the number of wells which were steamed and produced sulphur by the Union Sulphur Company, beginning with 1902?

A. I have not looked it up, but just for a few years.

Q. In all of the testimony you have given here you have not used any memorandum or reference, or consulted any document have you, except for the obtaining of information of the quantity of sulphur?

A. Only for the quantity of sulphur, and for the patents.

Mr. WUPPER.—The question is objected to as leading.

Q. Mr. Keever, have you the information as to how many wells were steamed and produced sulphur in the various years by the Union Sulphur Company, beginning with 1900 down to date?

A. I have the information in the records.

Q. Please state the number of wells, per year?

(Deposition of William R. Keever.)

A. In 1900, one well was steamed; in 1901, there were two wells; in 1902 there were two wells; in 1903 there were 11 wells; in 1904, there were 22 wells; in 1905, 19 wells; in 1906, 34 wells; in 1907, 27 wells.

Mr. WUPPER.—The answer is objected to as secondary evidence, incompetent and irrelevant.

Q. From where did you get the information as to the number of wells steamed?

A. From the records of the Union Sulphur Company's office.

Q. Those records are now in the Company's office? [160] A. Yes.

Q. What do you mean by a well being steamed?

A. I mean the hot water turned into the well from the plant for the purpose of liquifying the sulphur.

Q. When a well is steamed what does the well do.

A. It pumps sulphur if the hot water liquifies it.

Q. Did any of these wells fail to liquify the sulphur? A. Not that I know of.

Q. Then all of the wells referred to produced sulphur? A. Yes.

Q. What was used to bring the sulphur to the surface? A. Compressed air.

Q. Mr. Keever, in what other cases did you testify in which these various exhibits I have introduced in evidence, and now show you, and *mark* "Sulphur, Louisiana Exhibits One, Two, Three, Four, Five, Six, Seven–a, Seven–b, and Eight," were shown you and testified to about by you?

(Deposition of William R. Keever.)

A. It was in patent suit of the Union Sulphur Company vs. Freeport, Texas, and in California and Boston suits.

Q. Those same exhibits were shown to you in the California and Boston suits, then?

A. Yes, sir.

Q. By the California and Boston suits you mean the suits in which your testimony was taken the latter part of May, by Mr. Townsend and Mr. Bradbury?

Mr. WUPPER.—Question objected to as leading.

A. Yes, sir.

Cross-examination.

Mr. WUPPER.—Mr. Keever, to clear up a little ambiguity in the first [161] part of the record, you had a copy of the testimony which you gave the latter part of May in the suits of Concrete Mixing and Conveying Company vs. Stone & Webster, and in the suit of Concrete Mixing and Conveying Company vs. Great Western Power Company of California, before you at that time where you had ready reference to them, did you not?

A. I had it for about one or two questions, but it was immediately objected to by Mr. Wupper, and Mr. King took it away from me. I wanted to still keep it, but he would not let me have it.

Q. Mr. Keever, what was the consistency or viscosity as it came from the discharge pipe of the well? A. I never had it tested.

Q. Please compare it to some common, well-known substance.

(Deposition of William R. Keever.)

A. Well, it varied. When the temperature of the sulphur was right, the flow of sulphur, or the sulphur itself, was about like thin molasses.

Q. Would you say it was of about the consistency of heavy lubricating oil?

A. No, it flowed more freely than heavy lubricating oil.

Q. Did you ever at any time pump solid sulphur from the well? A. Hard sulphur?

Q. Solid, hard sulphur? A. No, sir.

Q. You state that you customarily forced hot water into the sulphur well, at what pressure did you force this water into the well casing?

A. It usually went into the well at boiler pressure, which was usually one hundred pounds. [162]

Q. In connection with the pumping of sand from the well on the property of the Union Sulphur Company about which you testified, would you say that the sand was suspended in the water similar to that manner in which it is carried along a rapidly flowing river?

A. It was suspended in the water, and brought along by the air pressure.

Q. The same was true about the dredging operations about which you testified where you raised mud?

A. Well, in flowing water, or mud or sand, the air goes into the liquid, which lightens it up and causes it to flow.

Q. Then in connection with all of your pumping operations that you conducted and testified about

(Deposition of William R. Keever.)

the raising of the matter was due to the difference in the weight of columns on the outside of the discharge pipe and that of the matter on the inside of the discharge pipe; is that true?

A. Well, it would never flow unless the air was introduced and of course when the air was introduced it lightened the column that was to be flowed and brought it out.

Q. Then it was true that the flow was due to the difference in the weight of the two columns?

A. Yes.

Q. Then the only way you could get a difference in the weight of the two columns was in the way the air was introduced into the two columns?

Q. After the air was introduced then the flow would be due to the difference of the weights in the two columns?

A. Well, I could not say that was so; I had no way of weighing it.

Q. In connection with the raising of mud concerning which [163] you testified you said that the mud was raised thirty-six feet approximately, by that you meant that where the water was approximately thirty feet deep you raised mud from that body of water so approximately six feet above the level of the water?

A. Yes. But you can plug the bottom of your line absolutely tight and flow out of it with the air, which shows that it is not an equilibrium.

Q. I show you here Sulphur Exhibit No. 3, and ask you when the original from which this copy

(Deposition of William R. Keever.)

was prepared was made? Approximate date will be sufficient.

A. I do not see that I can say even approximately when it was made.

Q. Was it before or after 1907?

A. It could have been before that, or it could have been after.

Q. In other words, you have not the faintest idea when it was made?

A. No, I could not say when it was made.

Q. When was the photograph of Defendant's Sulphur Exhibit No. 4 taken?

A. Well, I could not say, but I judge around about 1902.

Q. I hand you here Defendant's Sulphur Exhibit No. 8, and ask you if you know anything concerning the taking of the picture represented by that exhibit?

A. No, I do not know what that represents. It is only comparative.

Redirect Examination.

Mr. KING.—Mr. Keever, did you ever get any sulphur out of these [164] wells without putting compressed air in them?

A. Not since I have been here.

Q. Then you never brought any out by the forcing of hot water into the wells?

A. It has never been done since I have been here.

(Deposition of Samuel W. Maxwell.)

Q. You did put hot water into the wells and it never brought out any sulphur? A. No.

Q. What was it that brought the sulphur out?

A. Compressed air.

DEPOSITION OF SAMUEL W. MAXWELL, FOR DEFENDANT.

SAMUEL W. MAXWELL, a witness for defendant, whose deposition was taken at Sulphur, Louisiana, on August 30, 1927:

My name is S. W. Maxwell; I am 53 years of age and I reside at Sulphur Mines, Louisiana. I am Assistant Secretary of the Union Sulphur Company; I know in a general way that prior to 1907 the method used by the Union Sulphur Company in mining sulphur was "melting the sulphur by means of hot water and raising it to the surface by means of compressed air." My earliest experience in observing the pumping of wells by compressed air was in May, 1903. The sulphur came out of the ground from these wells in liquid form, coming out in gushes or slugs, I would call them. I first observed this pulsating action of the sulphur coming out in gushes in May, 1903. There was no difference at all in the way in which the sulphur came out of the ground in 1903 and 1907, or even later on. Compressed air was used in both years.

Q. Have you ever observed or had any experience in moving or lifting any other substance than sulphur by compressed air? [165]

(Deposition of Samuel W. Maxwell.)

A. I have not.

Q. You did not see any other material being moved?

A. Yes, I was there as an observer through courtesy.

Q. To what do you refer?

A. I saw them pump what we call the sand and gravel well just north of the Sulphur Mines; saw them pipe air into that well, and saw it flow out sand, water and gravel.

Q. What company operated the well you refer to as bringing up the sand, gravel and water?

A. Operated by the Union Sulphur Company, under direction of Mr. Keever.

Q. What machinery was necessary and used in bringing up the sulphur by the Union Sulphur Company? A. After the sulphur was melted?

Q. Yes. A. Compressed air.

Q. Were they using compressed air when you first came here? A. They were.

Q. About what was the size or weight of the original compressors they were using when you first came here?

A. A very small one, a little Clayton Compressor, weighing several thousand pounds; very small.

Q. Do you recognize this picture "Sulphur Exhibit No. 4," and if so, state what you recollect?

A. Yes, I recollect it. I had the picture taken.

Q. Do you know when it was taken?

(Deposition of Samuel W. Maxwell.)

A. Either in 1903, or the early part of 1904, but I think in May or June, 1903.

Q. Does the picture fairly represent what it appears to be, that is a sulphur well? [166]

A. It does.

Q. What is shown being delivered from the pipe?

A. Sulphur is being discharged from the three-inch pipe by means of compressed air?

Q. What is being discharged from the pipe that looks like it is flowing into a wheelbarrow?

A. That is water.

Q. How do you account for the appearance of the sulphur coming from the end of the pipe?

A. It is nothing more or less than a gush of sulphur, and that is guaged by the volume of air coming up through the three-inch pipe with the sulphur.

Q. You state that the sulphur came up in slugs, or intermittently, how do you account for the appearance of the sulphur in this picture?

A. The picture just happened to be taken as the sulphur gushed from a three-inch pipe.

Q. Is there any connection between the water well which you have referrd to and the sulphur well? A. None at all.

Q. Do you know whether the water well in the picture is an artesian well or pumping well?

A. Artesian well.

Q. Flowing of its own accord?

A. Of its own accord.

(Deposition of Samuel W. Maxwell.)

Q. What is the white substance in the bin, or board walls of the picture? A. Sulphur.

Q. In what form?

A. Part of it is solid sulphur, and immediately under the [167] discharge pipe is liquid sulphur. The bin immediately in front is congealed sulphur.

Q. About how large are these bins?

A. Well, that one looks to be about thirty-six feet square. There are four of these together. It was approximately that, anyway.

Q. How high above the ground was the sulphur pumped by compressed air?

A. When I first came here in 1903, we rarely pumped it up over three or four boards, for fear it might break loose and burst the side of the bin and get away from us. Later on we put them up to six and eight feet high, and later on to sixty feet high.

Q. By compressed air?

A. By pumping the sulphur into those bins by compressed air.

Q. Did you know Mr. Herman Frasch?

A. Intimately.

Q. Where is he now, is he living?

A. No, Mr. Frasch is dead. He died in 1914.

Q. Did you know Mr. Jacob C. Hoffman, who was a witness in the case of the Union Sulphur Company vs. Freeport, Texas Company?

A. I knew him.

Q. Is he living?

(Deposition of Samuel W. Maxwell.)

A. No, Mr. Hoffman is dead.

Q. Did you know Mr. Jacques Toniette, who was a witness in the above-mentioned case?

A. I knew him well.

Q. Is he living?

A. Mr. Toniette is dead. [168]

Q. Mr. Hoffman and Mr. Toniette were employed and worked for the Union Sulphur Company, did they not?

Mr. WUPPER.—Objected to as leading question.

A. Yes.

Q. What did they run steam down into the sulphur well for? A. To melt the sulphur.

Q. Did the steam commingle with the sulphur and come out with the sulphur?

A. It did not except on the occasions where the sulphur was exhausted, then the well would "blow," as we call it, and steam would come out of it.

Q. When the liquid sulphur was exhausted the steam would come out of the discharge pipe?

A. Yes.

Q. What would that indicate?

A. That we had pumped out the melted sulphur or it might mean the absence of any sulphur at all.

Q. I understand that when the well was being properly pumped no steam came with the sulphur?

A. No steam came with the sulphur.

Q. How long have you held your present office with the Union Sulphur Company?

A. Abount twenty-four and one-half years.

(Deposition of Samuel W. Maxwell.)

Q. Who was the man who first produced sulphur by compressed air process? A. Mr. Frasch.

Q. Herman Frasch?

A. Herman Frasch. [169]

Cross-examination.

(By Mr. WUPPER.)

Q. What was the density or viscosity of the sulphur that came from the discharge pipe of the well? A. I do not know.

Q. Please compare the density of the sulphur as it came from the discharge pipe of the well with that of some well-known substance?

A. It looked like thin syrup or discolored water, but that would depend, of course, on the condition of the sulphur, *it* it was molten and in its proper state, then it would look like rusty water or thin syrup.

Q. You have some of the equipment which you used, which is the same, or similar to that used back in 1903, 1904, or 1905, still on the ground?

A. We have. One machine only, now.

Q. The sketches and testimony of Mr. Keever and Mr. Maxwell regarding this equipment are objected to as secondary evidence in view of the witnesses' testimony that the sample of the equipment used is still in existence.

Q. Did you ever pump solid, that is, hard sulphur, from the wells? A. No.

(Deposition of Samuel W. Maxwell.)

Redirect Examination.

Mr. KING.—That machinery you spoke of would be rather unwieldy to take to Washington and introduce into court as evidence, would it not?

A. I should say. It weighs between 2,500 and 3,000 pounds.

Q. You testified that you saw them pump sand, water and gravel by compressed air, what would you have to add to [170] that to make concrete?

A. Cement.

Q. What is the nature of sulphur after it has been brought to the surface and congealed?

A. It is a hard mineral, having an aerated appearance, due to the air in the sulphur at the time it is discharged into the bin.

Q. Is it in a crumbled state, or otherwise? If not, explain its condition.

A. After the liquid sulphur is discharged into the bins it congeals into a solid mass, but when broken open has the appearance of being aerated. In that condition it weighs around one hundred and ten or one hundred fifteen pounds per cubic foot. When broken up, ready for shipping, it weighs about eighty pounds per cubic foot.

Q. Do you know the nature of the sulphur in the ground?

A. It is in honeycomb form, in rock.

Mr. WUPPER.—This question and answer are objected to as not relating to the subject matter brought out in the cross-examination.

(Deposition of Samuel W. Maxwell.)

Recross-examination.

Mr. WUPPER.—Without waiving any objections previously made I would like to ask Mr. Maxwell a few more questions.

Q. Mr. Maxwell, in connection with the pumping of water containing sand about which you testified that you had made some observations, how was the sand carried. Might it be considered as carried in suspension as the air raised the water from the well?

A. From my little knowledge of engineering I would say that it was suspended in the water as it is discharged from [171] the pipe by means of the compressed air.

Q. Mr. Maxwell, would you have any objection by the use of the defendant in this case to a set of equipment such as you have used in sulphur mining?

Mr. KING.—Objected to as irrelevant, immaterial and impractical.

A. I refer that to Mr. Keever, the vice-president.

Q. You ordinarily have charge of such things, and have more or less the disposition of the property that is now being used?

A. To a certain extent. This is not the ordinary case.

Mr. TOWNSEND.—The Sulphur, Louisiana, depositions are late. Mr. Keever is the vice-president of the Union Sulphur Company and Mr. Maxwell is the secretary of the Union Sulphur Company

at Sulphur, Louisiana. Their testimony relates to the pumping or moving of sulphur by compressed air from depths of five hundred feet to fourteen hundred feet and the prints that we have in evidence will show how that mode of operation was carried on. The witnesses show that from the year 1903 up until the time of this patent and long afterwards the pumping of sulphur, one of the most difficult substances to handle, could only be done and handled by compressed air and working on the McMichael principle.

The witnesses further show that the so-called slug action that those witnesses thought might occur was a regular and practiced habit of sulphur; that the sulphur came from these great depths in molten form where it had been melted by super-heated water at [172] about three hundred degrees Fahrenheit so that the sulphur stood at a temperature between two hundred and thirty-five degrees Fahrenheit, the melting point of sulphur, and three hundred and ten degrees, at which point sulphur became tarry and sticky and could not be moved, and that this sulphur mining industry, great as it is in the United States to-day, was founded by Dr. Frasch, a worker in this field, who had worked in the oil fields and used the oil—and used air compression before, and developed the fact that when there is molten sulphur coming around the bottom of the well, in molten form, acted upon by compressed air, it could be and was brought to the surface in merchantable quantities—in great quantities, and millions of tons was pumped by com-

pressed air and resulting in an outflow of pulsations up to the year 1907.

These same gentlemen also on their properties there at Sulphur employed the compressed air method for pumping sand and water and sand, mud and water, and where they had a thick, muddy substance they had also a pulsating action. That this was a very common and notorious use of pumping sand and water from great depths by compressed air. The next depositions on file and which we formally ask to be admitted are the depositions of four substantial business men at Crowley, Louisiana, some fifty miles from Sulphur,—

The COURT.—(Interrupting.) You say they are here?

Mr. TOWNSEND.—Yes, your Honor. At Crowley, Louisiana, and they relate to a use at the Crowley Brickyard [173] Company of pumping sand and water for brickyard purposes in the year 1902, and this sand and water was pumped in commercial quantities.

The COURT.—What sort of an action?

Mr. TOWNSEND.—The action is not described in these depositions. I would say that in the other case on cross-examination our friends found out that the action of pumping there was a pulsating action. They used an eight-inch pump and Mr. Landers, one of the witnesses in these depositions, described the pumping action. Mr. Bradberry and I were both present when he testified and said that the pumping action by air was a pulsating action.

(Deposition of Hicklin J. Landers.)

Those depositions are offered and are asked to be considered.

Mr. WILLIAMS.—Would Counsel, I wonder, name at least the depositions that he is offering? I got the name of one I understand, Maxwell—someone like that.

Mr. TOWNSEND.—These depositions are the depositions of Joseph G. Medlenka, Jack Frankel, Kicklin J. Landers and John Green.

The COURT.—Are they officially here?

Mr. TOWNSEND.—Yes, sir; in the Clerk's office.

The COURT.—This pumping was of sand and water, you say, in 1902. Pumping is not new, as far as that goes.

Mr. TOWNSEND.—Pumping by compressed air, no, but this is another form of so-called pumping. Now, the word "pumping" is the blowing. That is all that was. It was the blowing of this liquid or liquified form by the action of water, so we won't use the word "pumping," and we have no reference to any mechanical devices [174] other than the pipe to hold the liquid and a pipe to serve the air.

DEPOSITION OF HICKLIN J. LANDERS, FOR DEFENDANT.

HICKLIN J. LANDERS, a witness for defendant, whose deposition was taken at Crowley, Louisiana, on August 31, 1927:

My name is Hicklin J. Landers; I am past 60 and my residence is Crowley, Louisiana. I do not

(Deposition of Hicklin J. Landers.)

know what my occupation is; I am vice-president of the Acadia Iron Works, you might say I am purchasing agent of the Acadia Iron Works. I have lived in this community about 34 years; I have had experience in pumping minerals by compressed air. About 1885 or 1896 I was engaged in rice farming down in Vermillion Parish and we decided to put in a deep well and pump water by compressed air, which we did—put in an eight-inch well. That was my first experience with compressed air. The well was 200 feet deep as I recall it. We didn't know quite as much then about putting down wells as we do now. We didn't go as deep. We got along all right pumping water. It proved all right, the only trouble was that after we pumped a certain length of time it pumped sand and water. We kept pumping until we pumped out so much sand that all the ground around our well caved in, I suppose for 30 or 40 feet in diameter. That suspended our operations. To operate the machinery for pumping the water we used a steam engine and connected it with the air compressor; there was a steam pipe that run down inside of the well that forced the compressed air into the well and forced the water up—raised the water up with air—compressed air raised the water up and threw it out. The make of air compressor used was, I think, an Ingersoll-Rand. This well was located in Vermillion Parish, Louisiana. I do not know where that air compressor is now. After our well caved [175] in on us it was useless and we dis-

(Deposition of Hicklin J. Landers.)

posed of it to the Crowley Brick Company, I believe it was. Our well caved in and we couldn't use it any more was the only reason. We could not use it unless we put in a new well and we did not feel like doing that. After we disposed of it, I saw it once at the Crowley Brickyard pumping sand. It was pumping sand the same as it pumped water. They used the same principle, compressed air forced the sand to the top and lifted the sand out. The witness was asked if he had ever seen a compressor pumping any other substance than the water and sand he spoke of and answered, "Well, only at a distance, I have seen them working an oil well, but I have not been close to them." That was out around the Evangeline fields.

Q. Now, you speak of pumping sand and water by compressed air,—just explain in detail how the compressed air worked?

A. Well, I don't know as I can go into the fine points as to the compressed air. I know we had a steam engine hooked to the compressor and that a pipe down in the well, I don't remember just how deep, but probably 150 or 175 feet, and the air forced, when the air went down and out through the bottom the compressed air raised the water to the surface and it flowed out.

Q. That is what you mean by pumping?

A. Yes, that is what we mean by pumping.

Q. How near the surface of the ground did the water stand in the pipe of this water well?

(Deposition of Hicklin J. Landers.)

A. Well, down in that section in ordinary times I suppose the water came within twelve or fifteen feet of the surface,—it is only about ten or twelve feet above sea level, and I should say the water would stand about fifteen feet from the surface in ordinary times. Of [176] course, in dry seasons it was some lower.

Q. And you say, I believe, that this compressed air also forced out a lot of sand? A. Yes.

Q. What size pipe did the sand come out of?

A. The sand came out of the same size pipe as the water, about an eight-inch pipe.

Q. After the water came to the surface how was it discharged,—in what manner?

A. I had a discharge pipe on the pipe in the well and it would run out through that.

Q. Perpendicular or horizontal?

A. No, horizontal.

Q. When was this experience you had in pumping the water at your place in Vermillion Parish,—what year?

A. It was,—I can't remember exactly when it was, 1895 or 1896. It was about that time, either 1895 or 1896.

Cross-examination.

(By Mr. WUPPER.)

Q. In your well in Vermillion Parish about which you testified, what was the diameter of the casing?

A. It was eight inch.

Q. And the diameter of the air pipe that went down into the casing?

(Deposition of Hicklin J. Landers.)

A. I don't remember, it may have been about a three-quarter inch.

Q. How far down did the air pipe go?

A. I don't remember exactly, I should say possibly 150 to 175 feet, something like that. It might have been a little deeper or a little less. [177]

Q. What pressure air did you use?

A. I don't remember.

Q. How did you drive the air compressor?

A. With a steam engine?

Q. Was it directly connected to the compressor?

A. Yes, direct connections.

Q. By that you mean by belt? A. Yes, belt.

Q. What proportion of the material that came out of the well was sand and what proportion was water?

A. Well, I can't state just the proportion, only it worked all right, it was mostly all water in the beginning and then it began to be more sand, and more sand and water mixed, and then it come to be about half sand and half water, and kept coming that way until it caved in on us.

Q. Would you say that the sand was carried in suspension by the water?

A. Yes, it came up with the water. The sand and water came up together.

Q. How long did you operate that well in the Vermillion Parish?

A. Possibly a couple of months, six weeks or two months, from the time we started until it caved in. If it had not caved in we would have kept on.

(Deposition of Hicklin J. Landers.)

Q. You did not want the sand?

A. No, we wanted water. We installed it as an irrigation well to flood rice. We wanted water, not sand. In those times that was a new thing, none of us had any experience about it and we did not get the right kind of strainer, I suppose. We did not know anything about making strainers to keep sand out. [178]

Redirect Examination.

(By Mr. KING.)

Q. You did not know much about air compressors in those days?

A. No, sir, not as far as we were concerned, we did not know. We found that they pumped water all right if we kept the sand out.

DEPOSITION OF JOHN GREEN, FOR DEFENDANT.

JOHN GREEN, a witness for defendant, whose deposition was taken at Crowley, Louisiana, on August 31, 1927:

My name is John Green, I am 78. I will be 79 next month, October. I live in Crowley, Parish of Acadia, Louisiana. My occupation is handling grain, flour, and feed of all kinds at wholesale. The witness was asked if he had ever been interested in or connected with any brick concern and if so, what, and answered that he was interested in the Eckard Manufacturing Company and that the Crowley Brick Company was a part of the Eckard

(Deposition of John Green.)

Manufacturing Company. That was somewhere about 1902 to 1904, somewhere along there. The witness, upon being asked who else was interested in the Crowley Brick Company, replied "Mr. Medlanka and Mr. Frankel."

Q. In what capacity were you interested in that brick company?

A. I was a director in the company,—I think I was.

Q. Did the Crowley Brick Company ever use any air compressor in any operations?

A. Yes, for a short time, I believe.

Q. Just tell us what you know about their using an air compressor?

A. I never went there but once. I had no experience with it.

Q. Just state what you learned and saw when you were there?

A. When I was there they started pumping pretty soon after [179] I went there and I noticed it rolled out and the sand pretty lively. I was standing near and had to move away, as it was shoving it out pretty lively.

Q. Did it bring out anything besides sand?

A. Oh, there was some water mixed with it, but the body of it was sand,—there was some water all through it.

Q. You know how deep the well was?

A. No I don't. I know it was quite a depth, but how deep I don't know.

(Deposition of John Green.)

Q. What were you trying to obtain from that well by the use of compressed air?

A. I think they were trying to get water for brickyard purposes. I paid very little attention to it. I had other interests I was looking after, but I know they had this well.

Q. You know that it pumped out water and sand?

A. Oh, yes, I stayed quite a little while there at that time. It was interesting to me to see it work.

Q. Did you see the machinery they had there?

A. Yes, I saw the machinery but paid very little attention to it.

Q. About how long did the operations of taking sand out of the well by compressed air last?

A. I could not say how long they operated it. They must have been at it two or three months, more or less. I was only there at that particular time and then I stayed quite a while to see it operating and it was shoving up sand pretty lively.

Q. You don't know anything about the methods of the operation? A. No, I don't. [180]

Q. Do you know why they discontinued using it?

A. When it caved in.

Q. What caved in?

A. The well caved in around the pump.

Q. You mean the ground caved in?

A. Yes the ground caved in.

Q. You say these operations were back in about what time?

A. It was somewhere about 1904 or 1905,—somewhere between 1900 and 1905.

(Deposition of John Green.)

Cross-examination.

(By Mr. WUPPER.)

Q. You said that they pumped sand and water. You saw it being pumped out of the well at the Crowley Brick Co., would you say that the sand was carried in suspension by water as it came out?

A. Oh, no, it shoved it out away from there.

Q. About what proportion of the mineral which came out of the well was sand?

A. Why I would say it was at least seventy-five per cent sand. It seemed to be almost solid sand just running out of the pipe. There was water mixed with it. It was so much sand it would kind of pile up,—if there had been so very much water it would have washed away.

DEPOSITION OF J. G. MEDLANKA, FOR DEFENDANT.

J. G. MEDLANKA, a witness for defendant, whose deposition was taken at Crowley, Louisiana, on August 31, 1927:

My name is Joseph G. Medlanka. I am 57 years old, live in Crowley, Louisiana, and I am a lawyer. I have engaged in the practice of law since 1899. I was president of the Crowley Brick Company from 1901 to 1902, probably 1903. The [181] witness, upon being asked, "Do you remember the date of the incorporation of the Crowley Brick Company?" answered "I think it was about 1901. It has been so long ago." It was a Louisiana

(Deposition of J. G. Medlanka.)

corporation and its business was brick manufacturing.

Q. Have you ever had any experience of moving, or pumping or conveying minerals by compressed air?

A. Yes, our company undertook that. In the manufacture and sale of bricks we had quite a demand for sand, cement and material of that nature, gravel, etc., and Mr. J. Shoemaker, who was vice-president of our corporation, who is now dead, and Mr. Abbott, one of our stockholders, conceived the idea, from experience in these deep water wells that sand and gravel could be extracted from the depths of the earth and that this section contained a great deal of it. Their idea was to extract it by the operation of an air compressor, at that time Mr. Landers and Mr. Donnolley had an abandoned air compressor on their farm located in Vermillion Parish, and we purchased from them this air compressor, installed it at our brick plant in Crowley, having previously sunk a well to a depth of about 175 or 200 feet, setting the end of the casing in what was considered a good strata of sand and gravel and operated that well with this air compressor, extracting from the well a good deal of sand and gravel, which came up with the water.

Q. Do you know anything about the mechanical features of the well, size of pipe, etc., used.

A. Well, I know that the pipe from the air compressor was placed in the well going down into the casing and set in the strata of sand and gravel.

(Deposition of J. G. Medlanka.)

My recollection is that [182] the end of this pipe had an elbow and, of course, that tended to blow the sand and gravel up.

Q. About what size was the casing?

A. The casing,—I think the casing was ten inches,—it may have been an eight inch. Its been so long ago and the Crowley Brick Company does not exist any longer. It has been out of business probably 22 or 23 years now.

Q. When was it that these operations of pumping sand that you tell about by compressed air were conducted? About when?

A. Well, that was about 1902.

Q. Do you remember the kind of compressor used?

A. No, I don't remember the name of that. As I was going to say just now, our company has been out of business for over twenty years and some time ago in cleaning up my office I just destroyed all those records; all invoices, all receipts, correspondence, etc.

Q. Do you remember what the Crowley Brick Company did with that compressor?

A. They sold it.

Q. Do you remember who they sold it to?

A. No.

Q. About how long did they operate the compressor in this manner pumping sand?

A. Not more than a week for the reason that when they extracted the sand and gravel out of the well it caved in. The surface caved in. They

(Deposition of J. G. Medlanka.)

had to abandon that,—they found it was impracticable for that reason.

Q. About what quantity of sand was obtained at that time?

A. We estimated it was about ten or fifteen carloads. [183]

Q. Do you know the depth from what the sand was brought up?

A. The well was about 175 or 200 feet deep.

Q. Now, do you know what was in the bottom of this well where the end of the large pipe and the small pipe were?

A. They had no screen on it. The idea was to have the sand and gravel flow into the end of the casing and as it flowed in it was pumped out by the compressor. Of course, water, sand and gravel came in together.

Q. Now, just tell us what you know about how this sand and gravel was forced or pumped?

A. It was forced out by the air compressor. The air compressor forced air down through this pipe in the casing. It has a return elbow piece of pipe at the end. This sand and gravel, together with water, was forced to the surface and at the top there was an elbow on the end of the pipe that shoved it out on the land away from the derrick.

Q. Have you ever seen any other minerals being pumped, forced or conveyed by compressed air?

A. No, sir.

Q. Was that a common use of compressed air when you were using it that time for that purpose?

(Deposition of J. G. Medlanka.)

A. No, it was used for the purpose of pumping water, in forcing water up by air for the irrigation of rice land. I believe a short time after that the air compressor was used in the Evangeline oil field and I am rather under the impression that this compressor that we owned was sold to somebody in the Evangeline oil field and used there.

Q. You say that the well from which you pumped sand and [184] gravel was about 175 feet deep?

A. It was around 175 feet,—it may have been a little less than that.

Q. Was the sand and gravel that you pumped in the bottom of the well, or was it up higher?

A. It was at the bottom. Of course, there are several strata of sand and gravel, and I presume,—I am not a well man and don't know anything about the operation of the well how this was arrived at, or anything else, but from my general knowledge, and obtained from those in charge at that time, the end of the casing was set practically at the bottom of a gravel and sand strata and as the sand and gravel was pumped out it would flow to the bottom and then forced out.

(Objected to by Mr. Wupper as hearsay.)

Q. How deep did the water stand around the casing in that well?

A. The water came up within twelve feet of the surface, depending altogether upon the season. If it was a very dry season the water was very much lower.

(Deposition of J. G. Medlanka.)

Q. The water level in this section of the state is rather low, is it not?

A. They say during dry seasons the water goes down to about, around this immediate section, to about 28 or 29 feet from the surface.

Q. Will you give us an idea of the conditions as you know them as to the sand and water levels and sand and gravel stratas in this territory.

A. They strike gravel—a good strata of gravel and sand at about 150 feet, and first strata, and they strike them [185] at 225 feet, strike them at 275 feet, and at 300 and 350 feet.

Q. How do you fix the date of these operations you speak of by the Crowley Brick Co., as being about 1902?

A. We organized,—Mr. Carmouche looked that up before,—we were organized in 1901,—the latter part of 1901, I believe it was in the fall of 1902 when we undertook this operation.

Q. How long did the company stay in business?

A. We did not stay in business very long, until 1903, probably 1904. You know in going back into memory so far as these years are concerned and having no records at all to go by it is a pretty hard matter for me to be exact, but I am sure it was not later than the latter part of 1903.

Q. Do you know where Myron Abbott is at the present time?

A. No, I do not,—some time ago he was supposed to be at Maraugouin, over there in the flooded district.

(Deposition of J. G. Medlanka.)

Q. Do you know what the Crowley Brick Company did with that compressor? A. Sold it.

Q. Do you remember who they sold it to?

A. No, I don't remember.

Q. You spoke of having purchased that air compressor from a Mr. Landers, is that the same Mr. Landers who was here a while ago?

A. Yes, sir.

Q. He is presently connected with the Acadia Iron Works?

A. Yes, and it was bought expressly for the purpose of extracting this sand and gravel. [186]

Q. Who else was interested with you at that time in connection with the brick company?

A. There were Myron Abbott, Jack Frankel, J. F. Shoemaker, A. Kaplan, W. E. Lawson, O. E. Eckard,—

Q. Was John Green connected with it?

A. Mr. Green, yes.

Q. Where are Mr. John Green and Mr. Frankel at this time?

A. At Crowley,—there were also some New Orleans people interested in it, Mr. I. N. Nickelstein.

Q. Mr. Jack Frankel you spoke of there is the same man here present, and also Mr. Green.

A. Yes.

Q. Why did you quit operating that well,—pumping sand from this well?

A. Because of the cave-in. When we started these operations we thought that the upper structure of the well,—that is above the sand and gravel

(Deposition of J. G. Medlanka.)

strata from which we extracted the sand and gravel would remain intact and form a solid foundation and we could extract all sand and gravel we wanted to, but we found that it would not do it,—it caved in so as to make the operations very expensive.

Cross-examination.

(By Mr. WUPPER.)

Q. You testified that the sand came out with water in the Crowley brickyard well. What proportion of the total discharge was sand,—approximately?

A. From my observation, and I watched it during the process of operation, I would think that it was about 50–50.

Q. Fifty parts water and 50 parts sand and gravel?

A. Yes,—I was president of this corporation and Mr. Shoemaker [187] was vice-president, and we were very much interested in this because it meant a great deal to us if we could succeed and we watched the process very carefully, and we were very much disappointed when we had to give it up.

Q. The operation was really unsuccessful as a whole?

A. Well, yes, due to the fact that the cave-in occurred, not due to the process that we had of extracting because the air compressor certainly got the sand and gravel out of that hole.

Q. What kind of an air compressor did you use at that well? A. I don't remember the name.

(Deposition of J. G. Medlanka.)

Q. What air pressure did you use?

A. I don't remember that.

Q. Please describe the compressor if you don't know the name.

A. Well, it was what you call a horizontal, the pump that created the air lay horizontally and it was a pretty large machine,—operated from the fly belt of our engine.

Q. What kind of an engine did you use?

A. We had—now I can remember the name of that engine all right, it was a Brownell.

Q. What size engine was it?

A. It was 125 to 150 horse-power.

Q. Is any of that casing or air pipe eqipment that you used at that time in existence at the present time?

A. I couldn't say. We had a drying plant in connection with our brick plant, all consisting of pipe. We sold it all together to a man by the name of Dunn in Lake Charles. I don't know if he took all the pipe or not, whether he extracted it from the well,—we abandoned it. [188]

Redirect Examination.

(By Mr. KING.)

Q. Is the hole still there?

A. I could not say whether it is or not,—I think the cave-in could be located.

DEPOSITION OF JACK FRANKEL, FOR DEFENDANT.

JACK FRANKEL, a witness for defendant, whose deposition was taken at Crowley, Louisiana, on August, 31, 1927:

My name is Jack Frankel, of Crowley, Louisiana, occupation something of a general utility man. I am President of Bank of Acadia, President of Crowley Oil & Mineral Company, and various other institutions, and I am about 65 years old and have lived in Crowley a little over 40 years—ever since the town was started. I was connected with the Crowley Brick Company in the capacity of stockholder and director. The company was organized somewhere between 1900 and 1903, I think, and it existed for about two years, I think two years and a half. Mr. Green and Mr. Medlanka were associated with me at that time in the Crowley Brick Company.

Q. Have you had any experience of using compressed air for moving of minerals,--heavy minerals? A. Yes.

Q. Please tell about your experience.

A. The first time that we ever used compressed air here was in connection with the Crowley Brick Company. As I remember it, the clay of which the bricks were made here was a little too rich and it was suggested that if we could procure sand to mix in with the clay we could make a better brick, avoid the brick cracking during the process of

(Deposition of Jack Frankel.)

burning, and also have some sand for sale. We [189] heard of a water well that had been put down for the purpose of irrigating rice using an air compressor and it developed during the pumping season that the well made a great deal of sand, —in fact so much of it that it began to cave in and they had to abandon this process. We got in touch with these people and procured this air compressor and put down a well to the first sand and gravel strata, set the casing and started to operate the machine and it worked very successfully,— pumped out lots of sand and some gravel until it began to cave around the casing and as we operated the cave got larger, extended larger and larger in circumference until it threatened,—in fact, it put the derrick out of alignment so we had to stop.

Q. What kind of an air compressor was used, do you know?

A. I am not sure, but I think it was an Ingersoll-Rand.

Q. Did you see this well in operation?

A. Yes.

Q. Did you see the sand that came out of it?

A. Yes.

Q. You say that large quantities came out,— what do you mean by large quantities?

A. Oh, possibly 10 or 15 carloads. It piled up quite a hill around the area where pumped.

Q. Do you know how the compressor was operated, and how the well was operated,—if so, please explain to us how it worked.

(Deposition of Jack Frankel.)

A. The compressor was driven by a belt from the engine, the compressed air forced down into the bottom of the well and the returns that came up were mulsified composed of water, sand gravel. Of course, the water would run off and the [190] solids would accumulate on the surface of the ground.

Q. Why was it the Crowley Brick Co., discontinued the use of producing sand by this method?

A. On account of the well caving in. The more they took out the larger the cave got.

Q. Have you had any experience of moving any other substance besides gravel and sand by compressed air?

A. Later on we used compressed air in the oil field where we pumped quite a number of wells by compressed air.

Q. What was done with the air compressor that you had at the Crowley Brick Co.?

A. Disposed of same with the other machinery we had.

Q. Do you know to whom?

A. No, I am not sure.

Q. Was there any difference in the manner of using compressed air to move the sand and gravel and the oil that you speak of?

A. Not very material; no.

Q. Now, about when were these operations that you speak of moving sand and gravel by compressed air by the Crowley Brick Co.?

(Deposition of Jack Frankel.)

A. Shortly after we started operating,—perhaps six months after we started operations.

Q. And you started operations about when?

A. Well, I am not sure when, we started operating possibly three months after we were organized.

Q. When were you organized?

A. I don't remember, some time between 1902, 1902 or 1903.

Q. Can you put the outside limit?

A. The outside limit is between 1900 and 1903. [191]

Q. How did *you* sand and gravel come out of the pipe, in what manner?

A. It came out in mulsified form,—a pretty thick liquid.

Q. Do you know how deep the well from which the sand and gravel was pumped was?

A. It was somewhere between 150 and 175 feet.

Q. And the sand and gravel in the well you speak of was brought up from what depth?

A. From the bottom.

Cross-examination.

(By Mr. WUPPER.)

Q. The well which you had in the Crowley brickyard was similar to the compressed air water well, except that it did not have a strainer?

A. I presume so.

Q. And it worked approximately the same as a water well, except that it carried the sand up with it? A. Yes.

(Deposition of Jack Frankel.)

Q. You might say the sand was suspended in the water?

A. No, sir; the sand was mulsified very strongly with the water. It was pretty thick. It came out in gushes acting on the impulses of the machine.

Q. What proportion of the discharge from the pump was water would you say?

A. It was very thick, I should judge running around—it is pretty hard to tell—but not less than fifty per cent of it was solid matter.

Redirect Examination.

(By Mr. KING.)

Q. You spoke in answer to Mr. Wupper's question about the [192] sand and gravel coming out in gushes, how did it appear?

A. Well, it would act in connection with the impulses of the machine. These machines work with a piston and as the air was forced into the well it would react below and it would come up to the surface.

Q. Would it slack up at times?

A. It would slack up just the least bit.

(The witness here demonstrated with his hands as coming out in gushes.)

When the air was forced down it would come up in heavy discharge.

Q. You are not sure what made it do this, this is only speculation on your part? A. Yes.

Q. You would say then it came in pulsations?

A. Yes.

DEPOSITION OF EDMUND M. IVENS, FOR DEFENDANT.

EDMUND M. IVENS, a witness for defendant, whose deposition was taken at New Orleans, Louisiana, September 1, 1927 (Tr. 186). (Whereupon said deposition of Edmund Ivens was received in evidence, said deposition reading as follows:)

Mr. Ivens testified that he is a mechanical engineer and has followed such occupation for twenty years; that he graduated from Tulane University in New Orleans with the degrees of B. E. and M. E. and has followed his profession since graduation.

Direct Examination.

(By Mr. CALLAN.)

Q. Will you please mention some of the engineering projects with which you have been associated or identified?

A. Design, installation and tests of power plants of every [193] description practically, with the exception of water power plants.

Q. Will you please mention some of the projects with which you have been connected?

A. The following power plants: Joseph Rathbone Lumber Company; Louisiana Cypress Lumber Company; Eastman, Gardiner & Company; Jackson Public Service Corporation; Central Light & Power Company.

The following municipal plants: City of Natchez, Mississippi; City of Leland, Mississippi;

(Deposition of Edmund M. Ivens.)

Greenwood, Mississippi; Hattiesburg, Mississippi; Homer, Louisiana; Franklin, Louisiana.

The following air lift work; Crowley Oil & Mineral Company; Jennings-Haywood Oil Syndicate; Marmou Power Company, and possibly fifty or seventy-five others in both power plants, air lift and hydraulic work.

Q. Now, will you please state the nature of the work which you did for the electric light and power companies?

A. Design, installation and tests of complete and partial power plants, including light and water systems.

Q. Will you please define what you mean by the term "air lift"?

A. Elevating and transmitting of liquids, semi-liquids and solids through horizontal or vertical pipes is in general known as the "air lift system," when employing compressed air as a pumping medium.

Q. Please state whether or not the air lift is limited to liquids alone. [194]

A. It is not limited to liquids alone.

Q. What does the term "air lift" refer to as applied to this territory?

A. In this territory it refers principally to the elevating and transmitting of water and oil in deep wells.

Q. Will you state whether or not it is also used in the extraction of sulphur?

Mr. WUPPER.—Objected to as leading.

(Deposition of Edmund M. Ivens.)

A. It is no longer used in this territory for elevating sulphur. It was formerly used by the Union Sulphur Company at Sulphur, Louisiana, as a pumping means, but the operations have ceased in this field.

Mr. CALLAN.—Q. State whether there is any difference in conveying materials whether semi-liquids, or liquid, by air.

A. The principle is the same.

Q. Do you represent or have you represented companies dealing in compressed air machinery?

A. I represented for eighteen years the Ingersoll-Rand Company, and, for the past two years, I have represented the Chicago Pneumatic Tool Company.

Q. Please state whether you have given any particular study to the history of the air lift in conveying material by compressed air.

Mr. WUPPER.—Objected to as leading.

A. I have given a great deal of study to the subject, as well as being practically engaged in the installation of air lift plants.

Mr. CALLAN.—Q. Have you published any books or pamphlets on the subject? [195]

A. Yes.

Q. Will you please state what those books and pamphlets are, the titles and the dates of publication?

A. One book entitled "Pumping by Compressed Air," published by John Wiley & Sons of New

(Deposition of Edmund M. Ivens.)

York City in 1914; and a second edition of this book in, I believe, 1922.

The following articles: "Tests Upon Compressed Air Pumping Systems for Oil Wells," published, I believe, in 1909 in The Transactions of the American Society of Mechanical Engineers.

"Air Lift Efficiency," published in "Power," the date of which I don't recall.

There have been, in addition to those, possibly four or five articles on this subject and kindred subjects published from time to time in "Power."

Q. For what purpose did you write the book "Pumping by Compressed Air"?

A. Principally as a text-book for students and reference book for engineers.

Q. Has it been so used?

A. It has. It is being used as reference in the British Army Manual of the Engineering Corps.

Q. Will you please briefly detail the history of the air lift in conveying material by compressed air?

A. The first written record we have of the air lift, I believe, is found in the Book of Heron, which describes an air lift system used in the mines of Chemnitz, Hungary; the date, I believe, was some time in the middle of the eighteenth century. In the latter part of the eighteenth century, about 1790, a German engineer by the name of [196] Loscher performed some experiments with the air lift. Since that time, there have been issued by the Government for a number of systems.

(Deposition of Edmund M. Ivens.)

Mr. WUPPER.—The answer is objected to as obviously hearsay and incompetent.

Mr. CALLAN.—Q. Will you please state some of the uses of air lift, which you have observed in reading and experience on the subject?

Mr. WUPPER.—The question is objected to as incompetent, so far as it relates to what the witness encountered in his reading.

A. Elevating and transmitting of liquids, such as water and oil, semi-liquids and solids.

Mr. CALLAN.—Q. Will you please state what theories are recognized in the engineering profession in reference to air lift work?

Mr. WUPPER.—The same objection.

A. There are two well-known theories, namely, Saunders or Pohle and Frizell.

Mr. CALLAN.—Q. Please explain the Saunders and Pohle theory.

A. The Pohle and Saunders system or theory consists of a piston-like layer formation of liquid and air; and the Frizell system or theory consists of an aeration or bubble principle of admitting the pumping medium or compressed air.

Q. Will you please state the comparative times when these theories made their appearance?

A. The Pohle, I believe, made its appearance about 1880, and the Saunders about 1898. [197]

Mr. WUPPER.—Objected to as incompetent.

Mr. CALLAN.—Q. When did the Frizell theory make its appearance?

A. I don't recall that without looking it up.

(Deposition of Edmund M. Ivens.)

Q. Is that date shown in your book?

A. I believe it is.

Q. Would you kindly refer to your book, Mr. Ivans, "Pumping by Compressed Air," and state whether the date is shown in that book?

(Witness examines the book.)

A. On page 88 of my book, there is a record of patent granted to J. P. Frizell, No. 233,499, and granted in 1880.

Mr. WUPPER.—Objected to as secondary and incompetent.

Mr. CALLAN.—Q. Was the Pohle system patented?

A. The Pohle system was patented.

Q. Could you give the date and number of the patent?

A. The date 1882, patent No. 487,639. (Witness examining book.)

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. Is the Frizell principle illustration or described in your work, Mr. Ivens?

A. The Frizell principle is illustrated and described on pages 88 and 89 of my book.

Q. And the Pohle principle, is that illustrated in your work?

A. The Pohle system is illustrated and described on pages 90, 91 and 92 of the same book.

Q. How are the illustrations designated?

A. The Frizell is designated on page 88 by Figure 35, and the Pohle on page 91 by Figure 36. [198]

(Deposition of Edmund M. Ivens.)

Mr. WUPPER.—The same objection: the book itself is the best evidence of its contents.

Mr. CALLAN.—Q. Is the Saunders principle illustrated in your book?

A. The Saunders principle is illustrated and described on pages 93, 94 and 95.

Q. Is the patent number shown in your book?

A. The patent number is not shown.

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Will you please detail, Mr. Ivens, more minutely the Frizell and Pohle theories of operation of air lifts and what influence these theories have had on air lift development?

Mr. WUPPER.—The testimony is objected to as incompetent, unless the witness testifies that he is speaking from experience with this apparatus.

A. The Pohle system, as applied to well work, consists of a discharge line or eduction pipe inserted in the well casing. Between the well casing and the discharge pipe is hung an air pipe, the bottom of which is turned upward and inside of the discharge line. The ends of both discharge line and air line are submerged a given distance below the water level. Operation is as follows: Compressed air is forced inside of the small air line and released through the return bend inside of the discharge line. Air is admitted in a piston formation with the water, and these piston-like layers lighten the column inside of the discharge pipe to such an extent that the hydrostatic pressure outside of the dis-

charge line overbalances that inside and a flow is created [199] at the well top. The air pistons, on leaving the return bend, gradually increase in size as they approach the well top, due to elasticity of the air and reduced pressure.

The Saunders system operates on the same principle, that, a formation of piston-like layers of air and water; the difference being, however, that the space between the discharge line and the well casing is used to convey the air to the bottom of the discharge line, and no auxiliary air line or return bend is employed.

The Frizell system or principle consists in finally dividing the air volume into small bubbles or globules by using a foot-piece at the bottom of the discharge line for this purpose, and thereby lightening the column through an aeration principle rather than a piston-like formation principle.

Mr. CALLAN.—Q. In the Saunders system how is the air chamber created specifically?

A. The air chamber is bounded by the discharge line in the center, the well casing surrounding the discharge line, a flange at the well top, and the water level in the well.

Q. Is the well open or closed at the top?

A. Sealed.

Q. Is that construction shown in Figure 37 on page 93 of your book, Mr. Ivens?

Mr. WUPPER.—Objected to as secondary and incompetent.

(Deposition of Edmund M. Ivens.)

A. The sealing flange is shown by "F" prime in Figure 37, page 93 of my book.

Mr. CALLAN.—Q. Is the discharge pipe marked in the diagram in your book? [200]

Mr. WUPPER.—The same objection.

A. The discharge line is indicated by "D" prime.

Mr. CALLAN.—Q. Are the pistons illustrated?

Mr. WUPPER.—The same objection.

A. The pistons are shown by the alternate light and shaded areas.

Mr. CALLAN.—Q. Is the chamber which you have testified to shown in that diagram, and, if so, how is it designated?

A. The chamber is designated by the light space between the discharge line "D" prime and the well casing "E" prime—"C" prime.

Mr. WUPPER.—The same objection to the question and answer.

Mr. CALLAN.—Q. Can you give us its boundaries?

A. The boundaries are "f" prime, which is a flange; "E" prime—"C" prime, which is the well casing; "D" prime, which is the discharge line, and the line G–G which is the fluid level in the well.

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. Where is the compressed air admitted into the chamber?

A. Compresed air is admitted through the small pipe designated by "F."

Mr. WUPPER.—The same objection.

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Q. Have you ever installed any wells with such a construction?

A. Many of them.

Q. And with what result? [201]

A. The actual operation was reliable, but the efficiency not as good as other systems.

Q. Are those wells still in operation?

A. None that I know of.

Q. Have you ever equipped any wells employing the construction described in connection with the Pohle system, an apparatus such as is illustrated on page 91 of your book? A. Many of them.

Q. Now, when you did install such wells, how was your air let into the discharge pipe?

A. In the Pohle system, the air was admitted to the discharge line at or near the bottom with a small air pipe and a return bend pointing upward inside of the discharge pipe.

Q. Is such an air line illustrated in the book on page 91? A. It is.

Mr. WUPPER.—Objected to as secondary.

Mr. CALLAN.—Q. How is the air line marked in that diagram?

A. By small letter "a."

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. How does that pipe "a" extend in the well and deliver the air?

A. The pipe extends vertically downward between the discharge and the casing, terminating in the return bend referred to.

(Deposition of Edmund M. Ivens.)

Mr. WUPPER.—The same objection to the question and answer.

Mr. CALLAN.—Q. For what purpose have you used such construction?

A. For elevating water, oil and grains, vertically and horizontally. [202]

Q. Now, at page 108 of your book, there appears an illustration of an air lift construction. Please state what that is.

Mr. WUPPER.—Objected to as calling for secondary evidence.

A. Figure 47 on page 108 illustrates what is known as a combined Pohle and central pipe perforated end system. The idea of this double system is to obtain a reduction in the starting pressure of a well whose difference in static and dynamic heads is great. The well is started by opening valve "B" shown at the well top and closing valve "A." This admits air to the central system and the first head is blown off, thereby increasing the pumping head. When pressure is sufficiently reduced, valve "B" is closed and valve "A" is opened, and the operation begins and continues through this longer air line. The system is used extensively in oil well pumping where the heads are great and the pressures are high.

Mr. WUPPER.—That portion of the answer describing the illustration of the book is objected to as secondary.

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Q. How is the starting line marked?

A. The starting line is attached to valve "B."

Q. And is indicated by what lettering?

Mr. WUPPER.—The same objection.

A. Indicated by letter H-1.

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. And the valve, I understand, is identified by what letter?

Mr. WUPPER.—The same objection.

A. The letter "B." [203]

Mr. CALLAN.—Q. And that valve is in the short line which terminates at the lower end of line H-1; is that correct?

A. That's correct.

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. The long line is indicated by what marking, Mr. Ivens?

A. The long line is attached to valve "A" and is indicated in length by "H."

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. Is there a discharge pipe shown on that diagram?

A. There is.

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. How is the upper terminus or discharge indicated?

A. Indicated by an elbow.

Mr. WUPPER.—The same objection.

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Q. And the discharge is in that elbow?

A. The discharge is swung from the elbow.

Mr. WUPPER.—The same objection.

A. (Continuing.) This elbow referred to is the largest shown.

Mr. CALLAN.—Q. Is the line "A" inside or outside of the discharge line?

A. Line "A" is outside of the discharge line.

Mr. WUPPER.—The same objection.

Mr. CALLAN—Q. Is line "a" with the upward return bend at the bottom, like or unlike the line "a" that you described in connection with [204] the Pohle system on page 91?

A. It is like line "a."

Mr. WUPPER.—Objected to as calling for the opinion of the witness and as being not the best evidence.

Mr. CALLAN—Q. Will you turn to page 97 of your book, Mr. Ivens, and tell us what the diagram on that page has reference to?

A. Figure 41, page 97, has reference to the Harris theory.

Mr. WUPPER.—Objected to as secondary.

Mr. CALLAN.—Q. Do you know the full name of Mr. Harris?

A. Professor Elmo G. Harris.

Q. Do you know with what institutions he is presently connected or has been connected in the past?

(Deposition of Edmund M. Ivens.)

A. He has been or is connected with Columbia University or the University of Missouri.

Q. What is his reputation and standing in the profession in so far as compressed air work is concerned?

A. Professor Harris is considered an authority on compressed air work.

Q. Will you please turn to page 109 of your work, Mr. Ivens, and state briefly what was intended to be illustrated there?

A. Figure 48, page 109, is intended to illustrate a stage system of air lifts which is employed where the submergence would be insufficient if a single lift were employed.

Mr. WUPPER.—Objected to as not the best evidence.

Mr. CALLAN.—Q. Please state what you mean by submergence and its significance [205] in this work?

A. By "submergence" is meant, as the term indicates, the insertion of the air and discharge lines beneath the water level. This submergence is necessary in order that the air lift may be operated, and is referred to either in feet or in percentage. When referred to in feet, it means the distance below the water level that the air is admitted into the discharge pipe, and when referred to in percentage, it means this distance in feet divided by the total length of vertical air or discharge line.

(Deposition of Edmund M. Ivens.)

Q. Now, at page 152 of your book, there appears an illustration of an air lift construction. Will you please describe that with particular regard to your actual experience with such a system?

A. Figure 77 on page 152 illustrates the Harris system as manufactured by the Harris Air Pump Company of Indianapolis, Indiana.

Mr. WUPPER.—Objected to as secondary.

Mr. CALLAN.—Q. Go on and describe the system, Mr. Ivens.

A. This Harris system consists of an air line between discharge line and well casing, a foot-piece and a well top with connections. The foot-piece operates on the principle of an ejector, and there is provided within the foot-piece a *venturi* contraction. The air line has a return bend and admits air into the foot-piece in small finally divided globules.

The well top consists of a sealed flange and an auxiliary air line which admits compressed air at reduced [206] pressure between the discharge line and the well casing, thereby forming a cushion on top of the water level and between the flange and water level. This cushion compensates in a way for reduced submergence, and, at the same time, prevents the formation of a vacuum or partial vacuum between the well top and the fluid level.

The main operation of the system is accomplished by forcing compressed air through the outside air line into the foot-piece, the auxiliary air line simply acting to prevent vacuum and also prevent surging,

(Deposition of Edmund M. Ivens.)

and compensate, as stated, in a way for reduced submergence.

Q. Specifically how did it compensate for the reduced submergence?

A. By forming a pressure or cushion on top of the fluid level.

Q. Now, will you please explain what you mean by the term "reduced submergence"?

A. Submergence is reduced by the falling of the static head, and, in the event that this should be excessive, there would be loss due to slippage.

Q. What do you mean by the term "static head"?

A. Static head, when applied to deep wells, is the distance below the ground level that the water stands when the well is idle, or, in other words, the standing level.

Q. And what is meant by the term "dynamic head"?

A. By "dynamic head," that is the distance below the ground that the water stands when the well is in operation, in other words, the moving head.

Q. Now, I show you, Mr. Ivens, a pencil sketch which I will mark "New Orleans Exhibit No. 9," and ask you who [207] made that sketch?

A. I prepared the original of which this is a carbon.

Q. Was the original offered in evidence in the matter entitled "Concrete Mixing & Conveying Company, Plaintiff, vs. Great Western Power Company of California, Defendant"?

(Deposition of Edmund M. Ivens.)

A. I made the sketch; I can't say from my own knowledge just what was done with it.

Q. What is that sketch?

A. The sketch is intended to illustrate roughly the Harris system of pumping.

Mr. CALLAN.—We offer in evidence the sketch identified by the witness, marking same as "Defendant's New Orleans Exhibit No. 9."

Mr. WUPPER.—The exhibit is objected to as immaterial, irrelevant, and incompetent, and as being so faint and indistinct as to make the apparatus which it purports to represent indistinguishable and illegible.

Mr. CALLAN.—Q. Now, will you compare the operation shown in this Defendant's New Orleans Exhibit No. 9 with the operation shown in the Saunders method, Figure 37, page 93 of your book, and Figure 36 at page 89, illustrating the Pohle air lift?

A. The system illustrated by the sketch resembles the Saunders system in that the auxiliary air line designated by "B" admits compressed air into the air chamber between the discharge line and the casing.

The system shown by the sketch resembles the Pohle system in that compressed air is admitted into a small air line designated by "a" and admits air, through a return [208] bend into the foot-piece.

Q. What are the differences in the Harris system as compared with the Pohle and Saunders systems?

(Deposition of Edmund M. Ivens.)

A. The difference is that the resemblance to the Saunders system does not act to actually pump the fluid. The air chamber in this case simply provides space for a cushion of air.

The actual pumping done by the Harris system is done in a manner somewhat similar to the Pohle system the difference being the addition of the foot piece and the finally dividing of the air volume into small globules, whereas the Pohle system operates on the piston-like layer formation.

Q. What similarities and dissimilarities exist between the systems mentioned, in regard to the construction of the systems?

A. The Pohle and Saunders systems are simply made up with pipe and fittings. The Harris system is made up of a bronze or brass foot-piece of refined design, to go with a specially designed well top.

Q. Now, will you please state what the letter "F" on Defendant's New Orleans Exhibit No. 9 indicates?

A. The letter "F" indicates the auxiliary air line, and this air line terminates in the flange at the well top.

Q. Will you please state what the small "a" on Defendant's New Orleans Exhibit No. 9 indicates?

A. The small "a" indicates the main air line which terminates in the return bend at the foot-piece.

Q. Does or does not that line correspond with the

(Deposition of Edmund M. Ivens.)

air line "a" of the Pohle structure at page 91 of your book? [209]

A. It is the corresponding pipe.

Q. How does the Saunders method compare in efficiency with the other methods?

A. The Saunders system is not as efficient as other and later methods.

Q. Now, will you please compare the Saunders structure and operation of admitting air in pipe "F" with the Harris method in Defendant's New Orleans Exhibit No. 9?

A. The method of admission of air in both cases is identical.

Q. Which is the more efficient, the Harris or the Saunders? A. The Harris.

Q. And the reason for the greater efficiency is what, in your opinion?

A. The reason for the greater efficiency is that, in the Harris system, the air volume is broken up into small bubbles and globules, and it has been proven that where the air volume is broken up into these small bubbles, the loss by slippage is less, and the smaller the globules or bubbles the less the slippage loss. Experiment and calculations have proven that the air slippage loss varies as the square of the volume of the air bubble; therefore, it is advantageous to reduce the size of the air bubbles as much as practicable.

Mr. WUPPER.—Objected to as incompetent and secondary.

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Now, please compare the Harris method, as shown on Defendant's New Orleans Exhibit No. 9, with the method shown on Figure 47 of your book at page 108.

A. The only similarity between the Harris method and the system shown in Figure 47 at page 108 is that the actual [210] pumping is done by forcing compressed air down through the air line suspended between the casing and the discharge and terminating in a return bend.

Q. What is the Figure 47 designed to represent?

A. Figure 47 represents, as before stated, a system employed where there is a great difference between the static and dynamic heads, making the starting pressure excessive, in the event that the system were designed with proper submergence to take care of a heavy dynamic head. The operation of the inside line is for starting only, and the actual pumping is done by the outside line.

Mr. WUPPER.—Objected to as not the best evidence.

Mr. CALLAN.—Q. How does the Harris system compare, as to its operation on that reduced submergence, with other systems?

A. The Harris system is able to operate efficiently on a lower percentage of submergence due to the fact that a reduced submergence is compensated for in a way by the cushion of air which is provided in the air chamber by the auxiliary air line.

(Deposition of Edmund M. Ivens.)

Q. In general, what is the idea of a submergence?

A. The idea of submergence is to enable an air lift to operate, without submergence, the lift would be inoperative.

Q. And what effect has an increase of submergence on the operation of the system?

A. Increased submergence means increased operating pressure and decreased air slippage.

Q. And conversely a decrease of submergence means what? [211]

A. Reduced pressure and increase air slippage, so that it is necessary, in designing an air lift, to experiment and determine the most efficient point, and this point being that at which the sum of the two evils is least.

Q. In the Harris system, how do you compensate for the decreased submergence that you may meet with?

A. By putting a pressure on top of the fluid level in the air chamber.

Q. And it is to accomplish this that air is admitted through pipe "F"?

Mr. WUPPER.—Objected to as leading.

A. It is to accomplish this as well as prevent surging and the possibility of creating a vacuum. By creating a vacuum at this point would mean that the well was operating against itself.

Mr. CALLAN.—Q. Now, in submergence, what general rule or ratio applies between the depth of

(Deposition of Edmund M. Ivens.)

water or an amount of submergence and pounds pressure in different liquids?

A. It all depends on the pumping head and the actual conditions existing in the individual wells. For water wells, the percentage of submergence in this territory will seldom exceed seventy per cent.

Q. Express in terms, if you can, the ratio as to water. Say one hundred feet of submergence, or a head of one hundred feet of water, gives you what pressure at the bottom?

A. One hundred foot static head will create 43.4 pounds pressure. In other words, .434 pounds pressure equals one foot in head. [212]

Q. If you had two hundred foot head, what is the pressure at the bottom approximately?

A. 86.8 for static conditions. For dynamic conditions, it is necessary to make a correction for the velocity head.

Q. Have you seen wells in operation where the air lift is employed for either water or oil or anything else? A. Both.

Q. What is the deepest well where the submergence principle was used entirely in regard to water?

A. Water submergence in wells, I have seen as deep as six to seven hundred feet, and in oil wells as high as twelve hundred feet or approximately twelve hundred feet.

Q. And approximately what pressure in pounds would that give you at the bottom when the air line is let in?

(Deposition of Edmund M. Ivens.)

A. The water wells with the submergence stated, approximately two hundred and fifty pounds, and in oil wells approximately four hundred and fifty pounds. These pressures include the natural correction for velocity head.

Q. And in terms of percentage, what is that?

A. In terms of percentage, the water wells will range from forty per cent submergence to seventy per cent, and oil wells from fifteen to thirty per cent.

Q. What is the deepest well on the submergence plan that you have known in regard to oil wells?

A. The actual depths of the well run approximately two thousand feet in oil wells. There is a difference, however, between actual depth of well and depth of submergence.

Q. Have you employed the Harris method, as delineated on the sketch marked Defendant's New Orleans Exhibit No. 9, in air pumping? [213]

A. I have.

Q. And what kind of wells and to what depths?

A. In water wells and oil wells; the depths of water wells ranging from probably two hundred and fifty feet to possibly fifteen or eighteen hundred feet; in oil wells ranging from two thousand to three thousand feet. These figures are actual depths of well and do not refer to submergence.

Q. But where you are pumping with the two thousand foot oil well, what air pressure do you admit to one line or the other in the Harris method, that is, the line "F" or air line "a"?

(Deposition of Edmund M. Ivens.)

A. Two thousand foot oil wells may have static heads ranging from flowing wells or gushers to pumpers whose heads may be down seventeen hundred feet. Consequently the air pressure would vary from zero to six hundred pounds pressure, depending on the well.

Q. Now, would that be in line "a" or in line "F"?

A. That would be in line "a."

Q. And how many pounds pressure in line "F" under similar conditions?

A. That would also fluctuate, for in gushers there is no air lift used. In deep well pumpers, this pressure may run as high as one hundred to one hundred and fifty pounds.

Q. Now, in water wells, what is the approximate pressure in line "a" and line "F" on an average water well?

A. Water wells will vary as widely as oil wells, but I should say with a pressure of one hundred and fifty pounds in line "a," it might be found necessary to provide [214] as high as seventy-five pounds in line "F."

Q. Now, referring to the Harris method, Defendant's New Orleans Exhibit No. 9, assuming the structure was turned to an arc of ninety degrees, so that the receptacles and piping all lay horizontal, what would be the operation then?

Mr. WUPPER.—Objected to as calling for an opinion or conclusion of the witness, not based upon

(Deposition of Edmund M. Ivens.)

any questions or answers showing actual experience with the type of apparatus.

A. In the event that a supply of liquid was made available and the well properly sealed and piping properly installed, which is to be assumed, the operation would take place in like manner as if in a vertical position.

Mr. CALLAN.—Q. And your answer is based upon the fact that the air would continue to be admitted in "F" and also "a"?

Mr. WUPPER.—Objected to as leading.

A. Yes, it would be almost necessary to provide a continuous supply of pumping medium.

Mr. WUPPER.—The answer is objected to as the opinion of the witness, and not based upon any experience or facts brought out by the previous questions and answers.

Mr. CALLAN.—Q. Please tell us in detail what you mean by the term "slippage"?

A. By "slippage" is meant the passing by of air globules through the water column without doing effective work.

Q. What is meant by the term "velocity"?

A. By "velocity" is meant the feet per second of travel, [215] and in this case of the travel of the air and water in the discharge line.

Q. Now, what is the velocity of the average air lift at the well top?

A. Variable, ranging somewhere between ten or twelve to twenty-five feet per second.

(Deposition of Edmund M. Ivens.)

Q. And with that range of twelve to twenty-five feet per second at the well top, what would it be at the lower end of the discharge pipe?

A. That would also be variable, and would depend upon well conditions. A statement of figure would be simply a guess.

Q. In respect to the top or the lower end of the discharge, is the velocity greater or less?

A. Velocity is greater at the top than at the bottom, the difference depending upon pressure, length of line, pumping head and other variables.

Q. And generally, why is there this difference in the velocity?

A. Because of the expansion of the air volume from the bottom to the top, and which is due to reduced pressure or resistance. The gradual expanding of the air increases the volume, and volume increase means velocity increase.

Q. The subject of velocity is covered in your book, is it not, Mr. Ivens?

A. It is treated.

Mr. WUPPER.—Objected to as secondary.

Mr. CALLAN.—Q. Have you any reason to revise or correct any of the [216] statements you have made in regard to this subject.

A. No.

Q. On page 137 of your book, Mr. Ivens, you refer to a test of the Saunders system made "by the writer on oil Well No. 32 of Crowley Oil & Mineral Compay, Evangeline, Louisiana, and the results published in the proceedings of the Ameri-

(Deposition of Edmund M. Ivens.)

can Society of Mechanical Engineers, Volume 31, page 311." Will you just briefly tell about that work and what the operation was?

A. The idea of the test referred to was to determine which of two systems of air lift pumping was the more efficient. Tests were run on the Saunders system and the data compiled after making observations of the performance of the well, determining the water horse-power and also indicating the air compression and determining the indicated horsepower.

The Saunders system was then replaced by the Harris system and similar tests were made, data compiled and results compared.

Mr. WUPPER.—The answer is objected to as hearsay, and it not appearing from the witness' testimony that he participated in those tests.

Mr. CALLAN.—Q. Who conducted the tests?

A. I did.

Q. And who made the compilation? A. I did.

Q. On page 139 appear certain figures as to depth of well, diameter of discharge pipe, operating air pressure, etc. Will you please state what those figures [217] represent?

A. Those figures represent conditions existing in the well, together with such data and observations as made during the tests, and compilations thereafter.

Q. Have you published results of operations with the Harris method? A. Yes.

Q. In what publication?

(Deposition of Edmund M. Ivens.)

A. In the Transactions of the American Society of Mechanical Engineers, Volume of 1909, pages 326 to 329, this being a tabulation of the observations taken during tests of oil wells. The entire article begins on page 311 and ends on page 329.

Q. That article was entirely written and prepared by you, Mr. Ivens? A. It was.

Q. It was published at your direction?

A. It was published from my manuscript.

Q. And the date? A. 1909.

Q. That is the same article concerning which you testified in the case entitled "Concrete Mixing & Conveying Company, Plaintiff, vs. Great Western Power Company of California," in Equity, No. 1804, of the docket of the United States District Court for the Northern District of California, Southern Division?

Mr. WUPPER.—Objected to as leading.

A. It is.

Mr. CALLAN.—In connection with the testimony of the witness we offer and introduce the article to which we mark for [218] identification Defendant's New Orleans Exhibit No. 10.

Mr. WUPPER.—The exhibit is objected to as immaterial and incompetent.

Mr. CALLAN.—To what extent is the system of pumping by compressed air used, both in this region and elsewhere?

A. Very largely used in such industries as ice plants, waterworks, plants, electric light plants, sawmills, sugar factories, oil refineries, hotels, of-

(Deposition of Edmund M. Ivens.)

fice buildings, and in almost every industry located inland where surface waters are not available.

Q. Now, with particular reference to this locality?

A. In this locality, air lift is used in elevating water, oil, sulphur, and, in some instances, solids like grain.

Q. You mentioned sulphur. You have also testified, I believe, Mr. Ivens, that air lifts are no longer employed in mining sulphur. Was this method formerly utilized in mining sulphur?

A. By not being used in mining sulphur, I had reference to this territory and the particular installation at Sulphur, Louisiana. Air lift is still used in mining sulphur at the plant of the Freeport Texas Sulphur Company and the Texas Gulf Sulphur Company.

Q. What effect had the discovery of the Mr. Herman Frasch referred to in your article upon the sulphur industry?

A. The Frasch system of pumping sulphur made it possible to mine sulphur without the use of a large shaft; therefore, making available enormous sulphur domes for exploitation.

Mr. WUPPER.—Objected to as incompetent and immaterial. [219]

Mr. CALLAN.—Q. Now, on page 147, of your book, you refer to certain special applications. Tell us what knowledge you have of the various instances you mentioned?

A. The knowledge I have of those special applications is detailed on pages 147 to and including 149.

(Deposition of Edmund M. Ivens.)

The first application is an air lift for mine drainage and is nothing more or less than an air lift, and this is illustrated in Figure 72.

Figure 73 is also a simple air lift for conveying grains, with the addition of a horizontal piping system inserted into the elbow.

The system illustrated in Figure 74 is sulphur mining, and consists of a simple air lift with the added melting medium of super-heated water.

Mr. WUPPER.—Objected to on the ground that it is secondary and not the best evidence.

Mr. CALLAN.—Q. Is the air lift employed in the discharge of sewage?

Mr. WUPPER.—Objected to as leading.

A. The displacement pump is used in handling sewage.

Mr. CALLAN.—Q. And what is that?

A. The displacement pump consists of a cylinder or chamber wherein a supply of the liquid is allowed to collect. Compressed air is then forced on top of the sewage and the chamber emptied. The valve mechanism is so arranged that sewage is first admitted, a charge of air next admitted, and, after emptying the sewage, the air volume is cut off and the compressed air exhausted to [220] the atmosphere.

Q. Have you seen wells pump sand by air?

Mr. WUPPER.—Objected to as leading.

A. Nearly all wells in this locality pump sand.

Mr. CALLAN.—Q. What has been your experience in that?

(Deposition of Edmund M. Ivens.)

A. The wells in this locality are drilled into sand strata and receive their supply of water from them. A strainer is placed in the well to prevent the admission of sand, but these strainers are not entirely effective as quantities of sand find their way through the perforations and are pumped out with the water.

Q. What is the nature of the flow that you have observed?

A. In a free-flowing well, properly designed piping and sufficient and not over-sufficient supply of air, the discharge is fairly steady. In wells where the air supply is insufficient, or there is an oversupply due to an attempt at forcing, or the air lift itself is improperly designed, there is an intermittent flow known as "heading."

Q. Now, why does an insufficient air volume cause this intermittent flow?

A. An insufficient air volume causes an intermittent flow due to the fact that the volume, on entering the discharge line, immediately creates in the system a reduction in air pressure and this reduction in air pressure must be built up before the system can become operative. This occurs in regular cycles or intervals, causing a flow of first air and then water.

Q. And how has it been when you observed sand or gravel being pumped? [221]

Mr. WUPPER.—Objected to as leading; the witness has not previously testified that gravel has been pumped by compressed air.

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Q. Have you ever observed sand or gravel being pumped with water?

A. I have.

Q. State what difference there would be in the operation as previously described by you, in the case of sand and gravel.

A. There would be no difference in the actual operation of the air lift.

Q. When you have sand and gravel coming out of water, what is the appearance at that time of the discharge column?

A. That will depend upon the position of the discharge line. In the event that it is vertical, there will be a more or less even flow. In the event of a long horizontal line, there would be a tendency, due to difference in specific gravity, of the air riding the fluid; so that the appearance at the discharge end would be of a horizontal flow of air, and an arc of fluid.

Q. Is the line of demarcation between the air and fluid substance apparent to the eye? A. It is.

Q. Now in your testimony given in the Great Western Power Company case, previously referred to, there was exhibited to you a series of small pictures. Do you recall those pictures, Mr. Ivens?

A. I do. [222]

Q. Were those pictures identified by you in connection with the operation which you have just described.

(Deposition of Edmund M. Ivens.)

A. I can't say that they were identified, but there appeared to be a typical air lift discharge from a horizontal pipe-line. Only the end of the pipe was shown, and it was impossible for me to say just where this pipe came from.

Mr. WUPPER.—Objected to as irrelevant and incompetent.

Mr. CALLAN.—In connection with the testimony of the witness, we offer those pictures, which are now in evidence as New Orleans Defendant's Exhibit No. 11 in the case of Concrete Mixing & Conveying Company vs. Great Western Power Company of California, No. 1804 of the docket of the United States District Court in and for the Northern District of California, Southern Division.

In connection with the testimony of the witness, we offer in evidence Mr. Ivens' book entitled "Pumping by Compressed Air, Ivens 1914, marked Defendant's New Orleans Exhibit No. 12, and already offered in evidence in the case entitled Concrete Mixing & Conveying Company vs. Great Western Power Company of California, No. 1804 of the docket of the United States District Court in and for the Northern District of California, Southern Division.

Mr. WUPPER.—The exhibits are objected to as irrelevant and immaterial; and the exhibit showing the pictures of the discharge, in addition, is objected to as not properly identified as to the location of the original and as representing a condition which was seen or observed by the witness. [223]

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Q. The book offered in the case above mentioned, Mr. Ivens, is the same identical book from which you are now testifying?

A. I have only written one book, and it is the only book I know of by the title "Pumping by Compressed Air," and my recollection is that this book was offered in the previous case as an exhibit.

Cross-examination.

(By Mr. WUPPER.)

Q. Mr. Ivens, you stated that you had two editions of the book, "Defendant's New Orleans Exhibit No. 12." Are these two editions identical in so far as the matter referred to in your testimony is concerned, and as to the figure numberings and page arrangements and numberings?

A. I believe they are. I don't recall any changes other than additions at the back end of the book in the shape of actual installations and photographs and some mistakes in the mathematical formulae which were corrected.

Q. Where sand came up from the well with the water or oil, how was the sand separated from the water or oil?

A. Pumped into a surface reservoir, and the heavier fluid or the sand settled to the bottom and the toppings pumped into storage tanks or systems, depending on whether the fluid handled was oil or water.

Q. What is the largest percentage of sand pumped

(Deposition of Edmund M. Ivens.)

with either water or oil from a well within your knowledge.

A. The largest percentage of sand pumped with fluid was in oil wells, and, of course, there is a wide variation. [224] I have seen possibly as high as eighty to ninety per cent sand handled in fluids.

Q. You mean to say that eighty per cent of the discharge from the pump was sand?

A. From the air lift. This, of course, is a very abnormal condition and happens when strainers break and sand from the strata has no resistance into the well casing.

Q. Is it not true that, in your testimony given on or about May 30, 1927, in the case of Concrete Mixing & Conveying Company, plaintiff, against Stone and Webster, Inc., defendant, pending in the United States District Court in and for the District of Massachusetts, in Equity No. 2747, that you testified that the largest percentage of sand that you ever saw was about forty per cent of the total fluid?

A. This referred to normal operation of oil wells.

Q. Then the pumping of sand is always undesirable? As far as your experience goes, that is not a desirable condition for the well?

A. It is undesirable, decidedly.

Mr. WUPPER.—Without waiving any objections previously made, I should like to ask the witness questions regarding his opinion as to the operation of the apparatus represented by Defendant's Exhibit New Orleans No. 9.

(Deposition of Edmund M. Ivens.)

Q. If this apparatus were placed in a horizontal position, with the discharge pipe horizontal throughout its entire length, and the fluid being pumped and the air pressures maintained as described with reference to this apparatus, would there be any object in forcing air under pressure into the line represented as "a"? [225]

A. If there were fluid pressure in the manner stated, there would be no necessity for any system of pumping whatever, as there would be a gravity flow.

Q. That's all. [226]

DEPOSITION OF PHILIP L. WILSON, FOR DEFENDANT.

PHILIP L. WILSON, witness for defendant whose deposition was taken at Miami, Florida, on Saturday, September 3, 1927.

My name is Philip L. Wilson. I live at 1722 Jefferson Avenue, Miami Beach, Florida. I am a civil engineer. I have followed the practice of civil engineer since 1899. I graduated from Washington and Lee University, Lexington, Virginia in 1899. I received the degree of Civil Engineer from that University.

Prior to 1904 I was with the Ohio River Railroad, which is a branch of the B. & O. Then was with the Western Maryland for a few months, then with the New York Central & Hudson River Railroad for two years, then with the Southern Pacific, and came

(Deposition of Philip L. Wilson.)

to Florida in 1904. I was connected with the Florida East Coast Railway Company from 1904 to 1918. The lines of the Florida East Coast Railway Company are principally located between Jacksonville and Key West in the State of Florida.

During the years 1905 and 1906, I had charge of some of the dredges for the Florida East Coast Railway Company which were operated on the Florida Keys. My recollection is that the dredge "Manetto" was operated on Cross Key, "Babcock" and "Mikado" at Jewfish Creek. The "Rough Rider" was working on the opening between upper and lower Matecumbe, and dredges 1 and 2 between Lower Matecumbe and Long Key.

The object of the dredge work being done at that time was to make embankments or railroad fills. The nature of the material handled was marl, muck and roots, mostly.

The "Babcock" and "Rough Rider" were purchased by the Railway Company from a dredging concern in Georgia. I represented the East Coast at the time the purchase was made. These dredges were towed from Savannah to Miami and later on down the [227] Keys where they worked at various points. These dredges were purchased by the East Coast Railway Company in 1905.

The "Babcock" and "Rough Rider" are known as vacuum dredges. The first operation, the material to be moved is dug from the bottom of the ocean with a bucket and then deposited into a hopper. From this hopper there is a pipe-line to

(Deposition of Philip L. Wilson.)

a vertical cylinder about six feet in diameter and 12 feet high. This cylinder is filled with steam. Then water is injected into the cylinder, which condenses the steam and forms a vacuum. A valve is then opened and the material is sucked by the vacuum into the cylinder. This first valve is then closed and live steam under high pressure is let into the top of the cylinder. A second valve is opened and the material is pushed out by the pressure of the steam into a pipe-line which runs from the cylinder to the rear end of the dredge, thence through a connecting pipe-line to the fill or place where the material is to be deposited.

At Jewfish Creek the dredge "Babcock" handled peat, roots and small branches of trees. At Central Supply, which is the opening between Upper and Lower Matacumbe, the dredge "Rough Rider" handled marl with some shell. Marl is a decomposed coral rock of soft consistency grayish in color.

These dredges forced material through and out of the pipe-line for a distance of approximately 1,000 feet. The "Babcock" carried a fifteen-inch pipeline and the "Rough Rider" an eighteen-inch. The pipes were for the same purpose on each dredge. Both the inlet and outlet pipes were fifteen inches on the "Babcock" and the inlet and outlet pipes were eighteen inches in diameter on the "Rough Rider."

Marl makes a most excellent roadbed. In general appearance it has a grayish color. After it has hardened out [228] to a certain extent, it re-

(Deposition of Philip L. Wilson.)

sembles concrete or very hard stiff clay. The majority of the roalroad banks or fills of the Florida East Coast Railway Company were made on a very flat slope, and the action of waves rolling up and down on the slopes is comparable to the action if the fill had been made of hard soap. If marl is dug from the bottom of the ocean and deposited in the fill, it has a decided cementing quality but if it is broken up it will go into solution in water and remain in solution for several days.

The vacuum dredging machines which I have described breaks up the material somewhat, but not as much as a suction dredge would. Our original experiment showed that if we could move the marl from the bottom of the ocean into the fill without disturbing it at all, we would get a very much better road bed than if the material was broken up in transit, and the object in using the "Babcock" and "Rough Rider" was that the material could be conveyed through pipe-lines with less disturbance than any other type of machines that we knew of. Occasional pieces of rock and conch shells were conveyed with the marl.

Referring to the marl as dug up and deposited in the hopper, in each case of the "Babcock" and the "Rough Rider"—the marl is a soft mud and our object was to dig it up in big bucketfulls and deposit it in the hopper and thence transfer it to the fill without using very much water. I said these dredges were purchased in Savannah, Georgia in 1905. They were not new when we purchased them.

(Deposition of Philip L. Wilson.)

I was not familiar with them prior to that time. When purchased they were equipped as I have described, for the purposes indicated. My recollection is that we used these dredges as vacuum machines during the years 1905 and 1906 and as boom dredges from 1907 to 1918. The "Rough Rider" was sold to a firm in Cuba, and the "Babcock" is still in use by the Railway Company as a boom machine. [229]

The Florida Keys were visited by a hurricane in October, 1906, which made a very lasting impression on my mind, as one of our houseboats went to sea with quite a loss of life, and all of our floating equipment was more or less damaged. The hurricane occurred in October, 1906. I am positive that the dredges "Babcock" and "Rough Rider" were used prior to 1906. J. C. Meredith was my chief at that time. He is no longer living. Others beside myself who have knowledge of these machines which I have described are:

Ernest Cotton.
Capt. Warner.
R. J. Ring.

I am familiar with ordinary cement as it comes in sacks. [230]

Q. If you had cement mixed with marl in the way you describe, would that have varied the operation or changed the operation you had?

Mr. WUPPER.—Objected to as asking for speculative testimony and for the opinion of the witness who is not qualified as an expert.

(Deposition of Philip L. Wilson.)

A. I do not consider that cement would make ony difference one way or the other.

Q. Do you know whether any publicity was given to the work of the building of this line of the Florida East Coast Railway during the years you refer to?

A. Many magazines carried articles regarding the construction of the Key West extension.

Q. Was there any other line in Florida known as the "Key West Extension" of the Florida East Coast Railway than this line you are speaking of?

A. No.

Q. You testified on June 3, 1927, in the cases of Concrete Mixing & Conveying Company vs. Stone & Webster, Incorporated, and Concrete Mixing & Conveying Company vs. Great Western Power Company of California, did you not?

A. I do not recall the exact date but I have testified during the last six months.

Q. Since you gave that testimony and up to now have you or not seen and examined certain exhibits or photostatic copies of exhibits in the two cases referred to which I now hand you, to wit: Exhibits Nos. 21, 22, 24 and 25 known as New York Exhibits of those numbers as filed in evidence in those cases and Exhibits 121, 120 [231] and 125 and also Hussey Patent No. 497,427 and Hussey Patent No. 526,530. I have the papers just enumerated in my hand and now hand them to you and the question is whether or not you have seen these photostatic copies of said exhibits since the time you testified heretofore up to this morning?

(Deposition of Philip L. Wilson.)

Mr. WUPPER.—Objected to as leading, incompetent, irrelevant and impractical.

A. I have not seen these since I testified.

Q. I hand you, herewith, the photostatic copies referred to in my last question, being such copies of New York Exhibits Nos. 21, 22, 24 and 25 and of Hussey Patent No. 497,427, and of Hussey Patent No. 526,530, also of New York Exhibits Nos. 121, 120 and 125, and offer same in evidence as Exhibits 15–A, 15–B, 15–C, 15–F, 15–H, 15–I, 15–D, 15–E and 15–G, respectively, same being so marked and identified by the Notary.

Mr. WUPPER.—The exhibits are objected to on the ground that they are incompetent, irrelevant, immaterial and not proven as the original.

Q. Will you please turn now to Exhibit 21, being a copy of "The Railroad Gazette" for April 20, 1906, and look at pages 404 and 405 and read the portions thereof marked "a" and "b" and being Miami Exhibit 15–A.

Mr. WUPPER.—Objected to on the ground that it is secondary evidence.

A. I have read it.

Q. Will you kindly read those two excerpts out loud so that they may be in the record.

A. "A Dredge is at work there sucking up the peaty bottom [232] of the lake, which is dumped into a hopper and then forced through big pipes supported by pontoon bridges for a quarter of a mile to the point where an embankment for the railroad track across the lake is being built. The only

(Deposition of Philip L. Wilson.)

foundation the key offers at this point is mangrove roots. The sections of pipe resting on the pontoons have leather elbows to permit of flexibility. Rattling can be heard in the big pipe as the pieces of coral rock are forced through. Occasionally a large jagged piece of rock will tear through a leather joint and then the mud spurts.'"

Mr. WUPPER.—Objected to as incompetent, immaterial and irrelevant.

Q. Do you yourself recall any of the incidents referred to in the excerpt which you have just read?

A. I had charge of this particular work and the dredge referred to is the dredge "Babcock." The flexible joints were made of rubber instead of leather and only occasionally was there a piece of rock forced through the pipe.

Mr. WUPPER.—Objected to as incompetent, immaterial and irrelevant.

Q. With the differences which you have just detailed, do or not the excerpts which you have read actually state the facts as they occurred at that time and place?

A. They correspond to my recollection of the work at that time.

Q. I now ask you to look at copy of New York Exhibit No. 22 which is made Exhibit 15-B for your testimony, being a copy of "Engineering-Contracting" for October 16, 1907, [253] and look at page 227 and read the excerpt on that page marked "a."

(Deposition of Philip L. Wilson.)

Mr. WUPPER.—Objected to as incompetent, irrelevant and secondary.

A. "EMBANKMENTS IN WATER. The first long embankment to be started was that between Upper and Lower Matecumbe Keys—about two miles in length. A persistent attempt was here made to construct a high and at the same time narrow embankment by means of an hydraulic dredge. The ordinary process of forcing mud and water through a pipe to the joint of deposit being impracticable, the settling basin not being large enough, a combination dipper and hydraulic dredge was used. The material being taken from the bottom by means of the dipper, was dumped into a hopper in the hold of the machine, and at stated intervals was forced from this hopper by steam pressure, through a pipe in the place of deposit. This plan required much less water than the ordinary form of suction dredge, still so much was used of necessity, that the material was kept in a saturated condition."

Mr. WUPPER.—Objected as incompetent, irrelevant and secondary.

Q. What have you to say as to the facts detailed in the excerpt last read by you?

A. I have no recollection of a suction dredge being used at this point. The balance of the article is practically correct.

Q. Then do I understand that with the exception as to the suction dredge you could make the facts

(Deposition of Philip L. Wilson.)

stated in the [234] article as a part of your testimony or not?

Mr. WUPPER.—Objected to as leading.

A. Yes.

Q. Will you turn to the copy of New York Exhibit 24, being your Exhibit 15-C "The Railway Age," for April 19, 1907, and look at the illustration on page 632 as to coral rock and I will ask you first if, in your enginering experience, you are familiar with coral rock and know it when you see it?

A. I am familiar with it and I think I know it when I see it.

Q. From such knowledge and familiarity with coral rock can you or not identify the illustration of coral rock as given on said page 632 as a true illustration of coral rock? A. I cannot.

Q. Why not.

A. Because the picture is not large enough to see.

Q. Look at the illustration of the pontoons on page 633 and see if you can identify that.

Mr. WUPPER.—Objected to as indirectly calling for secondary evidence.

A. Pontoon lines resemble each other so much that I cannot identify the picture as being one of the pipe-lines that I had charge of.

Q. Is it or not a typical illustration of a pipe-line on a pontoon.

A. It is typical of the pontoon pipe-lines that we used on the Key West extension.

Q. Are you or not able to identify the illustration on [235] said page 633 as a photograph of the

(Deposition of Philip L. Wilson.)

identical pontoon in use by you and the Florida East Coast Railway Company on the Key West extension?

A. I can identify the pipe-line which is supported by timbers on page 633.

Q. You identify that pipe-line on page 633 as what?

A. As the discharge line of the dredge "Babcock" between Upper and Lower Matecumbe.

Q. Will you read the excerpt marked "b" on page 633.

Mr. WUPPER.—Objected to as calling for secondary evidence.

A. "The coral rock, of which a considerable portion of the roadbed is composed, makes an excellent foundation, and the same material crushed affords excellent ballast. As before stated, this crushed coral becomes as hard as rock after exposure."

Mr. WUPPER.—Objected to as incompetent, irrelevant, immaterial and not the best evidence.

Q. What have you to say as to the facts stated in the excerpt last read by you?

A. Coral rock makes an excellent roadbed but the crushed rock does not cement again and becomes as hard as the original piece.

Q. As I understand, you said that you identified the illustration on page 633 of this article under which the words are written "Key West Extension—A Filling of Pulverized Coral" as an illustration or photograph of the pipe on the "Babcock" dredge?

(Deposition of Philip L. Wilson.)

A. It is a discharge line of the dredge "Rough Rider' between Upper and Lower Matecumbe.

Q. Mr. Wilson, have you examined the copies of Hussey [236] Patents No. 497,427 and No. 526,-530? A. I have.

Q. State whether or not you know anything about those copies or what have you to say in regard to them or their relation to the dredges "Babcock" and "Rough Rider"?

Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

A. L. Hussey No. 526,530 is similar to the plant on the dredges "Babcock" and "Rough Rider." No. 497,427 indicates that this plant is operated by compressed air, while the dredges "Babcock" and "Rough Rider" were operated by steam.

Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. Please make examination of the copy of New York Exhibit No. 121 which is your Exhibit 15–D "Supplement to Engineering News, July 13, 1895" and look particularly at the illustrations and at the parts of the printed matter marked in pencil.

A. I have examined this.

Q. Referring to the illustrations shown on said copy of Exhibit 121 which is Miami Exhibit 15–D, *and* you or not identify any of said illustrations?

Mr. WUPPER.—Objected to as incompetent and immaterial.

A. I do not identify any of the illustrations shown here on this sheet.

(Deposition of Philip L. Wilson.)

Q. Does that answer apply to the photographic copy shown thereon as well as to the drawings?

A. The drawings are typical of the type of machines used [237] on the dredge "Babcock" and "Rough Rider."

Q. Was or not the same kind of machinery used on the "Babcock' and "Rough Rider" as shown by the drawings on the illustration on said Exhibit 15–D?

A. A similar plant was used on both of those dredges.

Q. And the photograph in the lower left-hand corner of the first page of said exhibit under which are printed the words "View of Dredge in Operation." State whether or not the appearance of that dredge as shown in the photograph is similar to the appearance of the dredges "Babcock" and "Rough Rider" or whether the illustration is large or full enough for you to so say.

A. The illustration is similar but not identical and is not a picture of either the dredge "Babcock" or "Rough Rider."

Mr. WUPPER.—Question and answer objected to as incompetent, irrelevant and immaterial.

Q. What have you to say with reference to the printed matter marked in pencil on said Exhibit 15–D as to the correctness of said statements and your concurrence therewith?

Mr. WUPPER.—Objected to as leading.

A. The descriptive matter on page 380, generally

(Deposition of Philip L. Wilson.)

speaking, is typical of the dredges "Babcock" and "Rough Rider."

Q. Will you kindly look at Exhibit 15–E, being a copy of New York Exhibit 120, "International Navigation Congress — 1902, Communication by John Bogart" and read the printed matter marked thereon in pencil. [238]

A. I have looked at it.

Q. What have you to say as to the statements made therein and your agreement with the facts of Mr. Bogart's or not?

A. The printed description on pages 10 and 11 is almost identical with the dimensions of the dredge "Rough Rider" with the exception that I do not recall that the dredge "Rough Rider" had any suction pipe cutter.

Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. Will you kindly examine copy of New York Exhibit 125, being Miami Exhibit 15–G, "Discussion on Dredging Operations," and read the printed matter marked in pencil?

A. I have examined and read that article.

Q. What have you to say as to the accuracy of the statements just read on Exhibit 15–G and your personal knowledge as to same and your agreement or disagreement with such statements.

Mr. WUPPER.—Objected to as incompetent, it not having been shown that the witness is familiar with the operations described in said exhibit, and as being immaterial and irrelevant.

(Deposition of Philip L. Wilson.)

A. The description on page 492 and page 493 of the print used is almost identical with my recollection of the dredge "Babcock." I have no knowledge whatever of the work done at this point.

Mr. WUPPER.—Objected to as incompetent, it not having been shown that the witness is familiar with the operations described in said exhibit, and as being immaterial and irelevant. [239]

Q. The point to which you refer is Newburgh, New York, as shown by said exhibit?

A. It is.

Q. Do you know anyone who was engaged in the operations at Newburgh?

A. Captain Sam Ross told me that he was employed on this work.

Mr. WUPPER.—Objected to as hearsay.

By Mr. GILLESPIE.—That is all.

Cross-examination By BENJ. F. WUPPER, Esq., on Behalf of the Complainant.

By Mr. WUPPER.—Without waiving any objections previously made I would like to ask the witness one question regarding defendant's Miami Exhibit 15–G, an alleged copy of "The Railway Age," Vol XLIII, No. 16, at page 633 thereof. Referring to said page 633, is the marked portion of the reading matter thereof pertinent to the illustration at the upper left-hand portion of this sheet?

By Mr. GILLESPIE.—I desire to ask the witness one question which I inadvertently forgot before I said that the examination in chief was closed and the witness not having yet answered any ques-

(Deposition of Philip L. Wilson.)

tion on cross-examination, I now ask the witness this question on direct examination.

Q. (By Mr. GILLESPIE.) Will you kindly read into the record the quotations marked in pencil which you examined on Miami Exhibits 15–C, 15–D, 15–E, 15–F and 15–G? [240]

Mr. WUPPER.—Objection is made to this question on the ground that the direct examination had closed and the cross-examination had commenced.

A. This is exhibit 15–C, page. 630. "One of the most remarkable pieces of railroad building now in progress is the extension of the Florida East Coast Railroad from Miami to Key West, Fla. The whole extension under construction is 128.15 miles, or from Homestead, Fla., the present terminus, to Key West. The distance from Homestead 74 miles will be constructed on land, the rest of the route being over swamp and water, of which about 25 miles may be considered swamp and 23 miles water. Work is progressing over the 74 miles of land and over the swamp work and water as rapidly as possible, the principal difficulty tending to delay the work being the procuring of the materials for concrete viaducts.

"Up to this time about 40 miles of grading have been completed from Homestead. On the entire route 50 keys must be crossed. Some of these are of considerable size, that is, have an area of several square miles, but most of them are small and their area is expressed in square rods. The distance apart vary considerably, and the depth of

(Deposition of Philip L. Wilson.)

water varies likewise from a few inches to 30 feet, the average depth being about 6½ feet."

This is Exhibit 15–C, page 633:

"The coral rock, of which a considerable portion of the roadbed is composed, makes an excellent foundation, and the same material crushed affords excellent ballast. As before stated, this crushed coral becomes as hard as [241] rock after exposure."

This is Exhibit 15–C, page 634:

"The halftone engravings accompanying this article are reproduced from photographs taken recently and show the latest progress of the work. For the map we are indebted to Railway Maintenance and Structures."

This is Exhibit 15–D, page 380.

"In the Hussey dredge, the shore delivery of the material is an essential feature, but this feature is entirely independent of the dredging, the dredging apparatus, merely dumping the material into a hopper or receiver, from which a pipe leads to the pumping apparatus. Fig. 1 represents a large dredge of this type which is now in use for filling in and reclaiming a large tract of land at Far Rockaway, N. Y., on Long Island. It consists of a large rectangular flat-bottomed hull, having at its front end two derrick towers, with braced booms, from which are suspended buckets of the 'orange-peel' type, having four curved triangular sections. Behind the towers are the pumping plant and receivers. The series of operations may briefly be

(Deposition of Philip L. Wilson.)

described as follows, the description referring to one of the two duplicate equipments with which the dredge is fitted: The bucket empties its load into a hopper, A, and when that is filled with the requisite amount of material to fill the pump, a vacuum is created in the cylindrical chamber, B (by a water spray condensing steam therein), so that when the steam-actuated valve, C, is opened the external atmospheric pressure drives the contents of the hopper forcibly through the inlet pipe, D, into the [242] pump, filling it nearly to the top. The inlet valve, E, is opened, while at the same time steam at 10 to 100 lbs. pressure (according to the elevation and the length of the delivery pipe) is admitted at the top of the pump chamber, driving the material out through the discharge pipe, F, the outboard end of which is supported by guys from an A-frame, and to this pipe is connected the shore delivery pipe."

Further reading from Exhibit 15–D, page 380:

"The machines are owned and operated by The Mining & Dredging Power Co., of 68 Broad St., New York, and we are indebted to Mr. John R. Stuyvesant, General Manager of the company, for drawings and photographs from which our cuts have been prepared.

"The principles employed in this dredge are those embodied in the various patents of Edward D. Harsen and Levi Hussey, and now owned by the company, and the company also owns a patented system for the application of the vacuum pump to

(Deposition of Philip L. Wilson.)

the combined operation of dredging and filling. The special features covered by the various patents owned by this company include the following: 1. The steam valve on the vacuum pump; 2. Combination dredge, elevating the material with any kind of elevating device, scoop, clam shell, endless chain, orange-peel bucket, etc., in combination with the receiver and a vacuum pump, the receiver being a regulator in which the material dredged is deposited and mixed to the proper consistency, and thence forced through pipes; 3. A vacuum pump, the intake and outlet valves of which are operated by steam, air, water [243] or any actuating medium; 4. A vacuum pump in which the material is discharged by compressed air and the vacuum formed by the steam from the air compressor."

This is Exhibit 15–E, page 10:

"Vacuum Pump Dredge: Soon after the beginning of the work on this canal two large dredging machines were built at Buffalo and brought by water to the canal."

"The designers of these machines expected that they would give effective and economical results, both in the indurated and in the softer material. The two machines were of exactly the same design and construction."

"The hull is 103 feet long, 34 feet wide and 10 feet deep. There are two decks, the upper one having sleeping and living rooms for the captain and all hands. All parts of the hull and upper works are strongly braced with heavy timbers and steel

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rods. The dredge is provided with large water tanks and coal hoppers. There are three anchoring spuds, two forward and one near stern. These are operated by an independent double drum engine. There are two Marine boilers each 150 horsepower, supplied with water by two Blake pumps. Two Steel Vacuum Chambers are near the center of the boat, each cylindrical 5 ft. diameter, 19 ft. high. There is a hopper attached to bow of dredge, 40 ft. long, 12 ft. wide, built of I beams covered with 3/8 in. steel.

"The bottom of hopper slopes to center of boat. A suction pipe 18 inches diameter runs from center of hopper into and close to bottom of hull, backward 35 feet [244] where it connects by a Y to two pipes also 18 inches diameter, going to the two vacuum chambers. From each of these an 18-inch pipe leads aft to a Y whence an 18-inch discharge pipe passes out the stern of the boat. There are four 18-inch valves, one in each brand of each Y. These valves are separately operated by steam pistons controlled at the pilot-house. In the hopper at entrance to suction pipe is a cutter with four 2½-inch blades. This cutter is run by a separate double cylinder engine. A high pressure Blake pump, 10 inches suction and 8 inches discharge, supplies water to the hopper."

"The dredging is done by the orange-peel bucket in the ordinary manner. This lifts the material from the bottom or sides of the excavation and drops it into the hopper which is supplied with

water by the large pump. The cutter is revolving in order to disintegrate the mass of excavated material. Steam is turned into one of the vacuum chambers and then cold water is pumped in through a spray, condensing the steam and forming a vacuum. The forward valve is then opened and the water and excavated material drawn from the hopper into the chamber. The valve is then closed, the real valve opened, steam turned into the chamber forcing the water and excavated material into and through the discharge pipe. While one vacuum chamber is discharging, the other should be filling, their work alternating and the discharge made practically continuous."

This is the quotation from Exhibit 15–F, page 407:

"EMBANKMENT CONSTRUCTION. Of the 128 miles of new [245] line, something like 98 miles are solid fill embankment or through cut. This work comprises all the line on hand and some 4/5 of the line over water. The fill in water will in some cases be of rock, but more usually this will be of marl or sand dredged from the bottom near the right of way. It is planned to place most of this filling with vacuum dredges, as by this process the dredge discharge has a much greater percentage of solids than does usually the discharge of hydraulic dredges, which will also be tried. Orange-peel and clam shell dredges will likewise be used; nearly all of the roadbed on the mainland will be placed by

(Deposition of Philip L. Wilson.)

such dredges working on both sides of the fill and digging their own channels as they progress.

This mainland portion of the line lies through low lands subject to frequent overflow. On the Keys themselves the work will be very light and nearly all embankment. Such cuts as these are through rock too soft for ballast or for concrete."

This is the quotation from Exhibit 15–G, pages 2 and 3:

"We have a lake, which constitutes our reservoir of about 200 acres, and by the raising of the lake it was made to overflow extensive flats, aggregating about 50 acres.

"The depth of the water before dredging varied from nothing to about 9 feet, and the depth of the much from 1 to 12 feet with an average of about 6 feet. The result was that the water was very much injured, becoming almost unfit for use. It was decided to clean [246] out these flats, and, in order to do so, without injuring or wasting the water during the operation, it was necessary to be very careful in choosing the method. Centrifugal pumps were excluded because they would require a stirrer to feed the suction, thus soiling the water, and wasting too much. The method finally approved by the engineers and adopted was proposed by Messrs. Babcock, Lary & Co., Contractors of Newburgh, N. Y., who skillfully and successfully completed the work. The method adopted was this. A large scow was built, with a bin in the bow, about 10 to 20 feet, and about 4 feet deep. A vacuum

pump or chamber was placed upon the scow and fed by two boilers. The suction pipe lead from the bin to the vacuum chamber with an intervening inlet gate. A discharge pipe lead through the scow, with a discharge gate at the chamber. A derrick, with a swinging boom, supporting a Heywood Bucket, holding 2 yds. of material, was mounted on the bow with the necessary hoisting machinery. This discharge pipe was connected with a 15-inch pipe placed upon pontoons made of barrels and carried to the shore, where it was connected with the shore line leading to the dumps. We carried it to a distance of from 500 to 3,000 feet with a maximum lift of about 44 feet.

"The operation was this. The bucket lifted the material into the bin, the vacuum was formed in the usual manner, the inlet gate was lifted, and the charge filled the chamber. Then the inlet gate was shut, the outlet gate opened, steam was let in, and the much was [247] driven to the dumps. The material was almost wholly much, varying from a consistency of peat to light fibrous material."

Mr. WUPPER.—Each and every portion of the above answer is objected to on the grounds as given in the objection to the question and also on the grounds that the answer is hearsay, not the best evidence, irrelevant, immaterial and incompetent.

Cross-examination (Resumed).

Mr. WUPPER.—I now request you to recopy the first question of the cross-examination into the rec-

(Deposition of Philip L. Wilson.)

ord and read it for answer by the witness, which question is as follows:

Q. "Without waiving any objections previously made I would like to ask the witness one question regarding defendant's Miami Exhibit 15–C, an alleged copy of 'The Railway Age,' Vol. XLIII, No. 16, at page 633 thereof. Referring to said page 633, is the marked portion of the reading matter thereof pertinent to the illustration at the upper left-hand portion of this sheet?"

A. The photograph labeled "Key West Extension—A Filling of Pulverized Coral" shows a discharge line of the dredge "Babcock" on the fill between Upper and Lower Matecumbe. The printed matter is misleading as it tends to show that the material between the flash boards is coral rock, while as a matter of fact the filling is marl and a correct description of marl would be to say that it is a finely pulverized coral rock. [248]

DEPOSITION OF GEORGE T. WARNER, FOR DEFENDANT.

GEORGE T. WARNER, defendant's witness, whose deposition was taken at Miami, Florida.

My name is George T. Warner. My age is 73. I am a police sergeant and my residence is 555 S. W. First St., Miami, Florida. I was connected with the Babcock-Lary Dredging Company from 1896 until, I should think, about 1902 or 1903, as I remember. The Babcock-Lary Dredging Com-

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pany was located at 29 Broadway, New York. They built vacuum dredges.

A vacuum dredge is a dredge using a bucket and a chute hopper. The bucket is used to take the material up from the bottom and deposit it in the hopper. When a sufficient quantity is placed in the hopper, a gate is opened leading to the vacuum pump and the material is sucked into the vacuum pump. The gate is then closed in the hopper and the expelling gate or outlet is opened and the material in the pump driven out through a pipe. The material is conveyed in the pipe to the point where it is deposited. A vacuum is formed in a large cylinder by steam—condensation of that steam forms a vacuum—the steam is forced in against an umbrella-shaped formation in the pump, which stirs the material up and when loosened it is forced out through the pipe. This umbrella-shaped formation is known as a baffle—striking against the baffle at the top of the vacuum pump, that throws the steam around the sides. The material is discharged out through a pipe.

The dredge "Babcock" was built in New York somewhere shortly prior to 1896 and operated for several years on Long Island, New York, and in and about New York. The dredge "Rough Rider" was built at Massena, New York, did some work up there which I had nothing to do with, was then brought down to New York and later on brought to Savannah, Ga. Both dredges, the "Babcock" and "Rough Rider" were under my control in

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Savannah, Ga. They were used in [249] the river to build the Seaboard Air Line Terminal—freight terminal—and we built three slips into the marsh with those two dredges, principally the "Babcock." The first slip was 1,500 feet long; that is from the river bank; the second slip was 1,000 feet long and the third slip was 800 feet long. Each of them was about 200 feet wide. The river we widened was opposite the city of Savannah, 135 feet I think,—as well as I can remember, 27 years ago. 1899 we commenced work and I think we finished that work there in 1902. Both dredges, the "Babcock" and the "Rough Rider," worked in the river at Savannah. There were differences in the structure and operation of these two dredges. The "Babcock" had one vacuum pump. The "Rough Rider" had two. The "Rough Rider" was built with the intention of using the pumps alternately, while one pump was being emptied the other would be filling. We found that didn't work first rate so we only used one pump in the "Rough Rider." The "Babcock" was used with one pump altogether.

We handled everything under the sun with the "Babcock" at Savannah. We picked up skulls, Spanish money, buttons off the coats of Revolutionary British Soldiers, rock, sand, everything else—watches—everything we found in that pump. The river and these slips that we dug in were on an old rice field opposite the city of Savannah and it was on that island—Hutchinson Island—that the

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British soldiers were in camp during the Revolutionary War, and it was the remains that a great many of the old camps left there that were disturbed. We dug up a number of wrecks and of old British gunboats. We recovered old British muskets which fell to pieces with the rust when we picked them up. We picked up old cannon and almost everything that you can name.

The "Babcock" had a 15-inch discharge pipe and the "Rough Rider" an 18-inch discharge pipe. We could put everything through the "Babcock" pipe of 15 inches that was anywhere from six to eight or ten inches. I did know of some pieces of rock going [250] through that were 12 inches in diameter. On the dredge the "Rough Rider" the rock or materials which did go through were proportionately the same.

The "Babcock" on the work I have just described was forcing material from 500 feet to 2,000 feet. I don't think we ever went over 2,000 feet.

Savannah was a naval stores port. Foreign vessels would come in there for the purpose of loading with naval stores. They would come in ballast. That ballast was thrown out largely at the point where we dug slip three, and it was said that a man of any nation could go ashore on that dump and stand on his native soil, meaning, in other words, that vessels from all over the world came there and loaded naval stores.

We had to get that ballast out and the only way we could get it was to dredge it out. We lifted it

(Deposition of George T. Warner.)

with the bucket, as I have before described, and put it in the hopper. Anything under 12 inches or up to 12 inches we could force through the pipe and out with the sand and other material. If it was larger than that we would have to pick it out by hand and throw it over.

The Savannah operation which was commenced in 1889 was continued, I think, until early in 1902—possibly the last part of 1901.

I continued with the dredges "Babcock" and "Rough Rider" after that period. I think the next work we did with the "Babcock" was at what was known as the "Plant System." That was a railroad that ran into Savannah at the time known as the "Plant System." I guess it was an organization of a number of roads put together and known as the "Plant System." The dredge worked on that job about two months, I think. That would be, I think, in 1902 or 1903; I can't be sure. After that we did some work for [251] the Government, deepening the channel at the Savannah River. We went from what is known then as West Broad Street up the river.

I left the Babcock-Lary Dredging Company, I think, in 1903 or 1904, when they went to the wall, and went with the Empire Dredging Company. I got Mr. H. P. Smart and some of his friends interested and they authorized me to bid in or see that the dredges "Rough Rider" and "Babcock" were purchased. The "Rough Rider" was purchased by that organization for $16,000.00; the "Babcock"

was purchased by the same parties for either $4,500 or $5,000. I was manager of that company until the dredges were sold in, I think, the early part of 1905, or the latter part of 1904, to the Florida East Coast Railway.

After the dredges were sold to the railroad in the latter part of 1904 or early part of 1905, I came with the dredges to Miami. After we came to Miami we went into the construction of the Florida East Coast Extension. I was with the "Babcock" mostly at that time and I think along in October, 1905, I went down to Jewfish Creek and Lake Surprise with the "Babcock." The other dredges followed later.

The "Babcock" and "Rough Rider" were both used more on the Keys than in the Everglades, and the character of the material which they picked up was coral rock, sand, and so on. Of course, we ran into some marl, but very little. The other dredges, not the "Babcock" or the "Rough Rider," and I presume you are not interested in them, they did marl work. In these dredges the vacuum was formed by steam condensation in the vacuum pump so called.

The "Babcock" was built somewhere shortly prior to 1896; I think in 1895 or 1896 in New York. The mechanical [252] engineers claimed that a dredge could not be operated that way. The "Babcock" demonstrated that it could be successfully operated. The reason for the building of the vacuum dredge was that the vacuum dredge could put out from 40

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to 60 per cent of solid matter and the rest water, while the centrifugal form of dredge put out about 15 per cent solid material and about 85 per cent water. The reason was [253] that the vacuum dredges were used to a large extent where a small volume of water was required to do the work.

Q. I show you Miami Exhibit 15–H and Miami Exhibit 15–I and ask you to examine said exhibits, which are copies of a certain dredge patent issued to one L. Hussey, and state from such examination as to any similarity or dissimilarity between the dredges as shown on such exhibits, and the dredges "Babcock" and "Rough Rider."

A. This is a very good exemplication. Here is the bucket—here would be the chute—here would be the vacuum pump—here would be where the vacuum would be formed—the suction would be from the chute into this pump—when it arrived at the point that the gauge would show was right, this gate would be closed—this gate would be opened—and the vacuum would throw the material out. (The witness pointing out various places on Miami Exhibit 15–I.)

Mr. WUPPER.—Objected to on the ground that it is incompetent, irrelevant and immaterial.

Q. The figure to which you refer in your last answer in Miami Exhibit 15–I; is that correct?

A. Yes, that is all right.

Q. And the gates to which you refer on said figure, can you state if they are marked with letters or any other designation on said exhibit?

(Deposition of George T. Warner.)

A. Well, that would be practically the same. This is the discharge pipe here.

Q. This letter "B." This letter "A," as I take the drawing—no, this would be the chute here, letter "B" would be the chute. This small "B," I take it, would be the gate here. [254]

Q. But, as I understand you, you say that Exhibit 15–I, the figure of dredge shown thereon is similar to the "Babcock" or "Rough Rider" or both?

A. The "Babcock" particularly, because there is only one pump; the "Rough Rider" had two pumps.

Q. What have you to say about the figure shown on Miami Exhibit 15–H, as to any similarity or dissimilarity with the "Rough Rider" and "Babcock"?

A. Well, I assume here that this is the discharge pipe—that would be the vacuum pump, of course—

Mr. WUPPER.—Objected to as irrelevant, incompetent and immaterial.

A. (Continued.) Here would be where the steam was drawn in to form the vacuum up here. This letter "a" inside the vacuum pump is the umbrella-shaped piece which I described in my testimony.

Q. The small letter "a" on the figure of Miami Exhibit 15–H is that what you refer to?

A. Yes, sir.

Q. The letter "a" above the capital letter "P"?

A. Yes, sir.

Q. State whether or not as a whole the dredge

(Deposition of George T. Warner.)

shown on that Miami Exhibit 15-H is similar to the "Babcock" and "Rough Rider," or dissimilar.

A. It is similar—I can only find one fault with it—I think the material is shown a little higher in there than we found was feasible in the operation of the dredge. But it is practically all right—it is practically the same.

Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

A. (Continued.) Here is the umbrella-shaped piece that I [255] described—this is the steam coming in—this brings the material up—this gate is closed—it is forced out through this pipe. (Pointing to Exhibit 15-H.)

Q. I show you Miami Exhibit 15-C and particularly the illustration on page 633, under which appears the title "Key West Extension—A Filling of Pulverized Coral," and also the illustration alongside under which appears the title "Key West Extension—Pipe Line on Pontoons," and ask you to examine said exhibit and said illustration and state whether or not you are able to identify the illustrations or either of them.

A. Yes; this is correct.

Q. Which illustration is that, Captain Warner?

A. This is correct. That is where it is carried on a trestle; this is where it is carried on pontoons. That would be filling in between these two points here. (Pointing to Exhibit 15-C.)

Q. Can you or do you or not recognize either of

(Deposition of George T. Warner.)

these illustrations as an illustration or picture or photo of any particular dredge or pontoons or not?

A. These pontoons represent, as far as I can see, almost exactly the pontoons used by the two dredges, particularly the "Babcock."

Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. I will ask you whether or not you saw these exhibits, Miami Exhibit 15–H and Miami Exhibit 15–I and Miami Exhibit 15–C, which you have just examined—whether you saw them before you took the witness-stand this afternoon or not.

A. This is the first time I have ever seen them. [256]

Cross-examination.

(Interrogatories by Mr. WUPPER.)

Q. Referring to the work that was done by the dredges "Babcock" and "Rough Rider" at Savannah, wasn't it frequently necessary to pump nothing but water to make the material flow?

A. Not altogether so, but we were filling in behind embankments and a great volume of water was apt to undermine or destroy these embankments, and for that reason the vacuum dredges were used. The right of way was built up by forming dikes fifteen feet high on top of the marsh, and we filled in between these two embankments, and a volume of water was apt to undermine them or destroy them, and for that reason the "Babcock" particularly was in demand.

(Deposition of George T. Warner.)

Q. And you said the discharge from these two dredges was somewhere between 40 or 50 or 60 per cent water? A. Yes, sir.

Redirect Examination.

(By Mr. GILLESPIE.)

Q. I believe you said, however, one dredge had a greater discharge of water than the other?

A. Only by reason of the fact that it had a larger discharge pipe and a larger vacuum pump.

Q. Which one was that?

A. That was the "Rough Rider." [257]

DEPOSITION OF ERNEST COTTON, FOR DEFENDANT.

ERNEST COTTON, a witness for defendant, whose deposition was taken at Miami, Florida.

My name is Ernest Cotton; I am 47 years of age; I reside in Miami, Florida, at 1611 N. W. 8th St., and I am director of public service for the city of Miami, Florida. I once had the occupation of railroading. I was with the Chicago & Northwestern on extra gang work; with the Illinois Central, directly under the bridge engineer, and with the Florida East Coast Railway on construction work. I went with the Florida East Coast Railway in 1904. I was on survey work for that company. After that I did concrete investigation; resident engineer and division engineer.

I studied civil engineering. I belong to the American Society of Mechanical Engineers.

(Deposition of Ernest Cotton.)

On the Florida East Coast Railway in the early building of the railroad known as the Key West Extension they employed bucket dredges, either clam shell or orange peel, dipper dredge, suction dredge and impulse dredge.

Describing in detail the impulse method of operation and the machinery employed for it,—the material was handled from its original position by bucket, either clam shell or orange peel, deposited into a hopper on the forward part of the machine, and conveyed from the hopper by means of a pipe to what is known as a vacuum pump, and discharged from the vacuum pump by steam pressure, the vacuum being formed in the vacuum cylinder by first admitting the steam and filling the cylinder with steam, and then cooling that cylinder by water pumped in over the top. Condensation of the steam would then create a vacuum, the gate between the pump and hopper would be open; then the difference in pressure on the hopper and less pressure in the cylinder would cause that material to be drawn into the vacuum cylinder, and when the vacuum had been filled with the material, the gate from the hopper to the [258] cylinder would be closed, the outlet gate would be opened, and steam turned in the top of the cylinder, which would force the plug of material out the cylinder and through the discharge pipe at the stern of the dredge and then through a pipe to the fill, that pipe being carried either on pontoons or trestle work.

(Deposition of Ernest Cotton.)

Q. I show you a paper which has the words "Exhibit 13" in the upper right-hand corner thereof and the seal of Paul D. McGarry, Notary Public, State of Florida, impressed in the lower left-hand corner thereof, and ask you to examine that and state what it is, if you know.

A. This was a sketch, a rough sketch, I made to exemplify the construction of a machine like the "Rough Rider" or "Babcock."

Q. As I understand you to say, you personally made this sketch? A. Yes, sir.

The sketch made by witness is offered in evidence in Miami, Florida, as Defendants' Exhibit 13.

By Mr. WUPPER.—The exhibit is objected to as irrelevant and immaterial and as not properly proved as to the location of the original.

Q. Mr. Cotton, you testified heretofore as a witness in the case of Concrete Mixing & Conveying Company against Great Western Power Company of California, pending in the United States District Court for the Northern District of California, and also in the case of Concrete Mixing & Conveying Company against Stone and Webster, Incorporated, pending in the United States District Court for the District of Massachusetts, did [259] you not?

A. Yes, sir; three or four months ago.

Q. The sketch, Exhibit 13, which has just been introduced in evidence, was that prepared by you this afternoon or on the occasion of your former testimony.

(Deposition of Ernest Cotton.)

A. On the occasion of my former testimony I made a duplicate or carbon.

Q. And the sketch which has just been offered in evidence is one of the carbon or duplicate copies made at that time? A. I think it is the original.

Q. You have here a notation "Suction and discharge line 15" and 18"—on this exhibit; can you explain that, please?

A. The "15 inches" referred to the dredge "Babcock" and "18 inches" referred to the "Rough Rider."

Q. Did you see these two dredges in operation?

A. Yes, sir.

Q. During what period of time? A. 1906.

Q. Was there any particular occurrence to place the date of that operation in your mind?

A. The knowledge of the work under way before the hurricane of 1906.

Q. Are you positive that the dredges were in operation in the manner described on the Key West Extension prior to the 1906 hurricane?

A. Yes, sir.

Q. In what month of 1906 did that hurricane occur? A. October.

Q. Was that just an ordinary sort of hurricane or an unusual event to stand out in your memory? [260]

A. It was my first one, and it did stand out.

Q. Do you know when these two dredges, the "Babcock" and the "Rough Rider," were purchased by the Florida East Coast Railway?

(Deposition of Ernest Cotton.)

A. In 1905.

Q. Who was the engineer in charge at that time?

A. Of the dredges?

Q. Yes, sir.

A. Mr. Wilson became engineer in charge of the dredges after they were bought.

Q. What Mr. Wilson is that?

A. P. L. Wilson—Philip Lindsay.

Q. State as to whether the two dredges referred to were better adapted for handling the substance you had to handle than any other type of dredge.

By Mr. WUPPER.—Objected to as incompetent.

A. Shall I answer it?

Q. Yes, sir.

A. They were better adapted on account of the fact that the materials would be more nearly in the form they were dredged, but particularly adapted to marl work, which we were trying to deposit to get in as nearly as it was dug without throwing it into suspension.

Q. What was the character and kind of material that was handled by these dredges in their operation on the Key West Extension?

A. They handled peat, rock, sand—a mixture—At Jewfish Creek and Lake Surprise, at Tavernier Creek and the opening between Upper and Lower Matecumbe they handled particularly marl.

Q. Will you please give us a description or definition of just what marl is? [261]

A. Finely ground limestone, I should say; shell or rock in practically powder form.

(Deposition of Ernest Cotton.)

Q. What is the effect of the operation or wash of waves upon marl?

A. More the effect of a wave on clay or soapstone material. It presents when wet a slick surface and a surface where a wave does not find many *point* of contact—a smooth surface. A wave will go on a marl bank without tearing up much of the surface and recede in the same way.

Q. Mr. Cotton, I show you here four specimens of rock substance and ask if you will kindly examine them and state from such examination if you know as to what character of rock formation that is, or if it is more than one character, state it.

A. This looks like Miami limestone. This seems to be the same. It is hard to tell what that is—it seems to be limestone with a shell cast. That is Miami limestone. This seems (referring again to this specimen) to be colite—like fish eggs, colitic.

Q. Then do I understand you to say that the four specimens of rock handed you are what you call Miami limestone, or limestone common in the Florida area?

A. Yes, sir. That is, one I wouldn't be able to classify without a fracture. It might be Miami limestone, from the formation here, or from the Keys, or from Cuba.

By Mr. GILLESPIE.—The four specimens of rock just handed the witness are offered in evidence at Miami, Florida, as Miami Exhibits 14–A, 14–B, 14–C and 14–D respectively. The specimen

(Deposition of Ernest Cotton.)

about which the witness was not positive as to its nature being Miami Exhibit 14–D.

Q. I will ask you, Mr. Cotton, whether or not any of said specimens are coral rock. [262]

A. I wouldn't call them that.

Q. State whether or not the dredges "Babcock" and "Rough Rider" conveyed rock of the character just introduced in evidence in their operations on the Key West Extension.

A. Just what do you mean by similar to that character?

Q. I mean as to their size or substance.

A. Size, yes; but as far as their being limestone, the portion they worked over is underlaid with coral rock, which is different from this in its structure and in its chemical analysis as it would run higher in lime content that is calcium carbonate.

By Mr. WUPPER.—The exhibits are objected to on the ground that they are immaterial and irrelevant and the answer is objected to as incompetent and immaterial.

Q. I show you Miami Exhibit 15–C and ask you to turn to the illustration on page 632, under which appear the words "Key West Extension—Sample of Coral Rock," and state whether or not you are able from the illustration to identify the rock shown therein as coral rock or not.

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

A. This seems to be coral rock.

(Deposition of Ernest Cotton.)

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. I show you Miami Exhibit 15–I, being a copy of Hussey Patent No. 526,530, and ask you to examine the figure of that patent and state whether it is similar to or dissimilar from either the dredges "Babcock" or "Rough Rider."

A. Schematically it is similar. There are differences. Did you want to know the differences? [263]

Q. The scheme as a whole you say is similar?

A. Yes, sir.

Q. Yes; will you point out the material differences?

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

A. This boom swings all the way around. The boom on the "Babcock" and "Rough Rider" only went through about 160 degrees. Also different in the hopper being outboard in front instead of behind the derrick.

Q. I show you Miami Exhibit 15–H, being copy of Hussey and Harson Patent No. 497,427, and ask you to examine same and state whether the figure shown thereon is similar to the dredge "Babcock" and "Rough Rider," or dissimilar.

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

A. This is not a dredge at all. This is where a vacuum is created by steam, probably, and then

(Deposition of Ernest Cotton.)

compressed air is used as the means for pushing the plug out of the cylinder.

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. I now show you Miami Exhibit 15–A and ask you to examine same and read particularly the excerpts marked "A" and "B" in pencil on pages 404 and 405, and state what you know yourself as to the facts stated or referred to in said excerpts.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

A. They use the word "leather" there instead of "rubber" in speaking of the sleeve that joins the two pipes.

Q. In other respects, are the facts therein stated accurate within your knowledge? [264]

A. I believe so.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

Q. I show you Miami Exhibit 15–B and ask you particularly to read excerpt marked "A" in pencil on page 227 and state what you may know in regard to the facts stated in said excerpt, particularly with reference to the two dredges and the dredging operations about which you have been testifying.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

A. To my knowledge, I don't remember that a suction machine was tried out on these jobs first. It says "a persistent attempt was made to construct"—and at the same time I am not sure that a

(Deposition of Ernest Cotton.)

suction dredge was ever tried out on that. That is one of the openings that the impulse machine worked on, and the majority of the work between Upper and Lower Matecumbe.

Q. Are the other facts and description as given in said excerpt correct to your knowledge?

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

A. Yes, sir.

Q. I now show you Miami Exhibit 15–C and ask you particularly to examine the two illustrations on page 633, captioned "Key West Extension—A Filling of Pulverized Coral" and "Key West Extension—Pipe Line on Pontoons," and to state whether or not you are able to identify either of said illustrations as illustrations of any particular pontoons or dredges or not.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

A. The illustration at the upper left-hand side of page 633 is what I would identify as the fill between Upper and Lower Matecume. The pontoon line might belong to the "Rough Rider" or the "Babcock" or a suction dredge. [265]

Q. Is the pontoon line shown in these illustrations similar to the pontoon lines on the dredges named?

A. Similar, yes.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

Q. Would you kindly read the little excerpt marked "B" on page 633 and state what you, of

(Deposition of Ernest Cotton.)

your own knowledge, know as to the facts therein stated, and your agreement or disagreement with that statement.

By Mr. WUPPER.—Objected to as leading, incompetent and irrelevant.

A. "The coral rock, of which a considerable portion of the roadbed is composed, makes excellent ballast. As before stated, this crushed coral becomes as hard as rock after exposure." The coral of which he speaks is not coral, but the rock is a coral rock formation, which means it is a sedimentary rock in which there are coral casts. There might be large niggerheads of coral surrounded by limestone. As to the "hardening effect after exposure," it is as hard when you get it out as it becomes. There may be a little sunbaking or weathering, or the softer portions may be softer than the hard portions, but rock is a hard rock to start with. I don't mean hard in comparison with granite, but it is hard in comparison with our soft Miami limestone here.

Q. I now show you Miami Exhibit 15–F and ask you to read the excerpt marked in pencil on page 407 as to embankment construction, and state as to your knowledge of the same.

By Mr. WUPPER.—Objected to as leading, incompetent and irrelevant.

A. They planned to fill the opening with the vacuum [266] dredges, but that didn't obtain. It was found too hard to get fresh water for the steam required for these machines. Therefore they were

(Deposition of Ernest Cotton.)

abandoned and turned into a different type of machine afterward. This was the Lower Matecumbe and Upper Matecumbe fill.

Q. With the exception just stated by you, does or not the excerpt which you have read describe the embankment construction as it was done?

By Mr. WUPPER.—Objected to as leading, incompetent and irrelevant.

A. This isn't a very good description of embankment construction. It simply makes a statement of about how many miles of water work and how many miles of land work there would be.

Q. I now show you Miami Exhibit 15–D, and particularly the first sheet thereof, showing several drawings and illustrations of the Hussey Delivering Dredge, and ask you to examine same and also to read the description thereof as marked in pencil on pages 379 and 380 and state its similarity to or dissimilarity from said Hussey dredge and the "Babcock" and "Rough Rider."

By Mr. WUPPER.—Objected to as leading, incompetent and irrelevant.

A. On the drawing the general scheme is the same as on the "Babcock" and "Rough Rider"; except that the dredge here—the "Hussey"—is shown with two derricks handling buckets, swinging to hoppers back of the derricks, whereas the "Babcock" and "Rough Rider" delivered forward. The general scheme for pump valves is the same. The discharge scheme is the same, except this would be operated on a short line. The description here

(Deposition of Ernest Cotton.)

describes almost identically the "Babcock" and "Rough Rider" so far as the *modus operandi* is concerned. [267]

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. I show you both at once Miami Exhibits 15–E and 15–G and ask you to read the portions thereof marked in pencil and state whether same tally with the description of the "Babcock" and "Rough Rider" dredges in a general way or not.

A. Yes, sir; this is a very good description of the "Babcock" here, as far as the operation is concerned.

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. When did you first see these Exhibits 15–A to 15–I inclusive?

A. I may have seen some of these pictures in magazines when they came out. These photostatic copies here—when I testified before, I am not sure whether any of these were among them or not. But this was not among them—15–D—this is the first time I have seen this. This is the first time I have seen this one, 15–G. This is the first time I have seen 15–C. This is the first time I have seen this one, 15–H—and 15–I. It is the first time I have seen that.

Q. It may be possible that you saw one or two of these photostatic copies before, or the originals when the magazines were published?

A. I may have seen the magazine articles.

(Deposition of Ernest Cotton.)

Cross-examination.

(By Mr. WUPPER.)

Q. With reference to Exhibits 14–A, B, C and D, you stated that they appeared to be similar to the limestone found around the city of Miami; it couldn't very well be from some other part of the county, could it? [268]

A. Well, I wouldn't say that, because so far as we know there is no other limestone similar to the Miami limestone, so Sanford stated in his geological reports.

Q. Well, I know I haven't seen anything any place else that is the same as this Miami limestone. Take Sioux quartzite; for instance, there are very few places where such quartzite is found, you know. Certain rock have a separate structure.

Mr. TOWNSEND.—Now, we come to the New York depositions. I have not had a chance to open them, but I understand they are the depositions of Mr. James McIlvrid, Harry C. Laporte, Julian A. Sohon and Clinton H. Crooks.

We offer these depositions in evidence.

(Said depositions of Julian Sohon, James McIlvrid, Harry C. Laporte and Clinton H. Crooks were received in evidence, said depositions reading as follows:) [269]

DEPOSITION OF JULIAN A. SOHON, FOR DEFENDANT.

JULIAN A. SOHON, defendant's witness, whose deposition was taken at New York City, on September 6, 1927.

My name is Julian A. Sohon; I am 31 years of age; my residence is 314 Patterson Ave., Hasbrouck Heights, New Jersey, and I am chief Bibliographer in the Engineering Societies Library at 29 West 39th St., New York City. I have been connected with the library seven years. I have the degree of Bachelor of Chemistry from Cornell University. That degree was granted in 1918.

The Engineering Societies Library comprises the four libraries of the American Society of Civil Engineering, the American Society of Chemical Engineering, the American Institute of Electrical Engineers, and the American Institute of Mining and Metallurgical Engineers. There are approximately 150,000 volumes in the Engineering Societies library.

I am often called upon in litigated matters to prove scientific and technical books and publications.

Q. To what extent are the books and records of this Library accepted as evidence in such cases?

A. I know of no case in which they have not been accepted.

By Mr. WUPPER.—Objected to as incompetent and irrelevant.

(Deposition of Julian A. Sohon.)

A. It is not customary to permit volumes to leave the library. It would not be done without being compelled by legal process.

Q. Have you among your records, the "Engineering News" of 1902, Volume XLVII, Number 1, and more particularly page 1 of said volume? [270]

Witness looks for volume referred to and states it is being used in the Library at the moment.

By Mr. HILLIARD.—It is hereby stipulated and agreed that true copies of such publications as may be offered in evidence in the deposition of this witness and of the witnesses McIlvrid, Crook and LePorte, may be introduced in evidence with the full force and effect of the originals, and counsel for plaintiff hereby waives his objection to such copies merely on the ground that they are copies and not the originals provided the defendant before trial of this case shall supply the plaintiff's counsel with similar copies.

By Mr. WUPPER.—We will so stipulate with regard to copies of publications only, and if the copies are furnished to us free of charge.

(By Mr. HILLIARD.)

The previous question is withdrawn pending the arrival of the volume referred to.

Q. I show you an article entitled "Concrete Viaducts on the Key West extension of the Florida East Coast Railway," by George P. Carver, and ask if you will tell us what publication that article appears in?

(Deposition of Julian A. Sohon.)

A. That is in the "Engineering Record" of October 20th, 1906, Volume LIV. Number 16, 424 to 427.

By Mr. HILLIARD.—A photostat copy with illustrations of said article is hereby offered as New York Defendant's Exhibit No. 20.

By Mr. WUPPER.—The exhibit is objected to as immaterial and irrelevant. [271]

(By Mr. HILLIARD.)

Q. I call your attention to an article entitled "Key West extension of the Florida East Coast," by Harry C. Smith. Will you state what publication that appears in?

A. That is in the publication "Railroad Gazette" of April 20, 1906, Volume XL, Number 16, pages 404 to 406.

By Mr. WUPPER.—For the purpose of objection, I should like to ask one question.

Q. You have no personal knowledge of the date or fact of this publication except that you find it in the records of the Library?

A. I find it in the records of the Library.

By Mr. WUPPER.—The testimony is objected to on the ground that the date of the publication is not properly proven.

By Mr. HILLIARD.—I offer in evidence a photostat copy of this article as New York Defendant's Exhibit No. 21.

By Mr. WUPPER.—Same objections as to Exhibit No. 20.

(Deposition of Julian A. Sohon.)

(By Mr. HILLIARD.)

Q. Are these publications which contain Exhibits 20 and 21 a recognized authority on the subjects in which they deal? A. They are.

Q. I show you an article entitled "Florida East Coast Railway Key West Extension" by Howard Egleston, Tell us what that article appears in and the nature of the publication, date, etc.

A. This article is in the periodical "Engineering —Contractings," [272] of October 16, 1907, Volume XXVIII. Number 16, pages 227 to 228. The first page of this issue contains a stamp showing that it was received by the Library on October 21, 1907. This periodical is also one of the leading periodicals in its field.

(By Mr. WUPPER.)

Q. Your knowledge of the date on this publication and its contents is based on your connection with the Library, is it not? A. It is.

By Mr. WUPPER.—The testimony is objected to as incompetent and not sufficient knowledge of the date of the publication, Mr. Hilliard, may this objection be understood on all the publications to save time?

By Mr. HILLIARD.—Why, yes. It is understood that this objection will apply to all the publications which are to be identified by Mr. Sohon.

By Mr. HILLIARD.—I offer this article last referred to as New York Defendant's Exhibit No. 22.

(Deposition of Julian A. Sohon.)

By Mr. WUPPER.—Same objection as to the publication.

(By Mr. HILLIARD.)

Q. I show you an article entitled "Construction of Florida East Coast Railway," by Allan Hale. Will you please tell us what book this is from, the date, etc?

A. This is in the "Scientific American" of May 16, 1907, Volume XCVI, Number 20, pages 412 and 413. [273]

By Mr. HILLIARD.—I offer copy of this article last referred to as New York Defendant's Exhibit No. 23.

By Mr. WUPPER.—Objected to as irrelevant and immaterial, and of an alleged date subsequent to the filing date of the application of the patent in suit.

(By Mr. HILLIARD.)

Q. I call your attention to an item entitled "A Florida East Coast Railway Extension to Key West was opened," etc. What periodical does that appear in, page and date?

A. This is in "Engineering News" of January 16, 1908, Volume LIX, Number 3, page 75.

By consent, the witness reads the following statement:

"The Florida East Coast Railway Extension to Key West was opened and has been completed from Miami to Knights Key, 109 miles, and was formally opened for traffic recently by the running of the first passenger train over the line, carrying the

(Deposition of Julian A. Sohon.)

principal officers of the road including its president, Mr. Henry M. Flagler. At Knights Key, connection is made with a steamers for Havana, only six hours distant. Another year will be required to complete the remaining 47 miles to Key West. On the completed portion, the total length of railway constructed in or over the water is 72,884 feet, or about 14 miles. The Southern section to Key West will add 78,550 feet to this, or there will be nearly 30 miles in all of over-water construction on the completed road."

By Mr. WUPPER.—Same objections. [274]

By Mr. HILLIARD.—I show you an article entitled "The Key West Extension of the Florida East Coast Railway." Please state what periodical this appears in, date, etc.?

A. This is in "The Railway Age" of April 19, 1907, Volume XLIII. Number 16, pages 630 to 634.

Q. What is the character of this publication, "The Railway Age"?

A. "The Railway Age" is one of the leading railway periodicals.

By Mr. HILLIARD.—I offer in evidence a copy of the article last referred to as New York Defendant's Exhibit No. 24.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to a further article entitled "Key West Extension of the Florida East

(Deposition of Julian A. Sohon.)

Coast Railway." Will you please state what periodical this appears in, its date, etc.?

A. This is in "Engineering News" of October 19, 1905, Volume LIV, Number 16, pages 407 and 408.

Q. Is there anything on 409?

A. And also figure 4 page 409.

By Mr. HILLIARD.—This article is offered in evidence as New York Defendant's Exhibit No. 25.

By Mr. WUPPER.—Same objections except for lack of alleged priority.

(By Mr. HILLIARD.)

Q. I show you an article entitled "The use of compressed air in tubular foundations, and its application at South [275] Street Bridge, Philadelphia" by F. E. Collingwood, member of the Society, and ask what book this appears in, the date, etc.?

A. This is in the "Transactions of the American Society of Civil Engineers," Volume VIII, July 1879, pages 186 to 188.

Q. What is the character of this publication?

A. This is the official publication of the leading civil engineering society in this country.

Q. How often are these transactions published and what is the usual procedure, annually, semi-annually, or what?

A. These publications are issued monthly.

By Mr. HILLIARD.—I offer this article in evidence as New York Defendant's Exhibit No. 26.

By Mr. WUPPER.—Same objections.

(Deposition of Julian A. Sohon.)

(By Mr. HILLIARD.)

Q. I show you an article entitled "The Shone Hydro Pneumatic System of Sewage," by Uban H. Broughton, of December 31, 1892, and ask what periodical this appears in?

A. This is in the "Transactions of the American Society of Civil Engineers," Volume XXVII, December 1892, pages 659 to 674.

By Mr. HILLIARD.—I offer in evidence page 659 and pages 662, 663, 664, 665, and 666 and ask that they be offered in evidence and marked New York Defendant's Exhibit No. 27.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.) [276]

Q. I show you a volume with a paragraph entitled "Grouting by compressed air" and ask where and in what volume that appears?

A. This is on pages 62, 63 and 64 of Minutes of Proceedings of the Institution of Civil Engineers, paper 2873 by James Henry Greathead, Volume CXXIII, 1896. The entire paper is on pages 39 to 73.

By Mr. HILLIARD.—I offer these pages 62, 63 and 64 in evidence as New York Defendant's Exhibit No. 28.

By Mr. WUPPER.—Same objection.

(By Mr. HILLIARD.)

Q. I call your attention to another volume, to a paragraph entitled "Duckham's pneumatic dredger." Will you state what book that appears in, the date, etc.?

(Deposition of Julian A. Sohon.)

A. This is in an article entitled "Dredging Operations and Appliances" by John James Webster, which appeared as paper 2157 in the Minutes of Proceedings of the Institution of Civic Engineers, Volume LXXXIX, 1887, pages 2 to 32. The paragraph in question is on page 15.

By Mr. HILLIARD.—I offer in evidence page 15 of this publication as New York Defendant's Exhibit No. 29.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you another volume, and call your attention to page 303 thereof. Will you please tell us what that article appears in—what publication—date, etc.

A. This page is included in an article entitled "Grain Appliances at the Mill Wall Docks" by Frederic Eliot Duckham. This is paper 2784 and appeared in Minutes [277] of Proceedings of the Institution of Civil Engineers, Volume CXXV., 1896, pages 296 to 309.

By Mr. HILLIARD.—I offer in evidence page 303 of this publication as New York Defendant's Exhibit No. 30.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—In this same publication I call your attention to page 386, and offer that page as New York Defendant's Exhibit No. 31.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to an article entitled

(Deposition of Julian A. Sohon.)

"Pneumatic Machinery for Loading" by Frederic Duckham, and ask if you will state what publication that appears in and in connection with it the two plates numbered XXX and XXXI?

A. This is in the "Transactions of the Institution of Naval Architects" Volume XL, 1898, pages 127 to 132, and plates numbered XXX and XXXI are found in the back of this volume.

By Mr. HILLIARD.—I offer in evidence pages 127 to 131 inclusive and plates numbered XXX and XXI as New York Defendant's Exhibit No. 32.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you an article entitled "Compressed Air Dredger for Gold Mining" and ask what periodical it appears in?

A. This is in a periodical "Compressed Air," March, 1898, Volume 3, number 1, page 403.

Q. What is the standing of this periodical and to what [278] extent is it known?

A. This periodical has been in existence for about thirty years.

Q. Is it a recognized authority on compressed air matters. A. I do not know.

Q. Is it a publication of general circulation in its lines? A. Yes.

By Mr. HILLIARD.—I offer in evidence this article, particularly page 403 as New York Defendant's Exhibit No. 33.

(Deposition of Julian A. Sohon.)

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

A. I show you another volume on Compressed Air containing the article "The interesting example of the Pohl Air System" and another article entitled "Some information in regard to air lift pumping." What periodical are these in?

A. These are in the periodical "Compressed Air" January, 1902, Volume 6, number 11, pages 1655 to 1658 and 1658 to 1659.

By Mr. HILLIARD.—I offer in evidence pages 1655 to 1659 inclusive as New York Defendant's Exhibit No. 34.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to another article entitled "Removing sand from wells by compressed air." Will you please state what periodical this appears in, date, etc.?

A. This is in the periodical "Compressed Air," August, 1902, Volume 7, Number 6, pages 1941 to 1943. [279]

By Mr. HILLIARD.—I offer in evidence these pages 1941 to 1943 as New York Defendant's Exhibit No. 35.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to three articles in this volume, first, the "Liernur Pneumatic Sewage System at Stansted," another article entitled "Compressed Air in the elevation of tailings," an-

(Deposition of Julian A. Sohon.)

other "Cyanidation at the Kalgoorlie Mine." Please tell us the periodical they appear in, dates, etc.?

A. The first article is in "Compressed Air," August, 1903, Volume 8, Number 6, pages 2515 to 2516. The second article is in "Compressed Air" September 2903, Volume 8, Number 7, page 2566 to 2567, the third article is in "Compressed Air," October 1903, Volume 8, Number 8, page 2594 to 2598.

By Mr. HILLIARD.—These pages and articles are all offered in evidence as New York Defendant's Exhibit No. 36.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. In the same volume I call your attention to an article on pages 2723 to 2735 inclusive, and ask if you will state on what date that article appeared, what periodical, etc.?

A. This is in "Compressed Air," January 1904, Volume 8, Number 11.

By Mr. HILLIARD.—A copy of that article is also offered in evidence as New York Defendant's Exhibit No. 37.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.) [280]

Q. I show you an article entitled "Compressed Air for Electric Railway Shop." Please state where that appeared, date, etc.?

A. This is in "Compressed Air" May 1904, Volume 9, Number 3, pages 2911 to 2922.

(Deposition of Julian A. Sohon.)

By Mr. HILLIARD.—I offer this article in evidence as New York Defendant's Exhibit No. 38.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I refer you to page 2975 to "Compressed Air." Please tell us what the article refers to and what is the date of publication?

A. This is part of an article entitled "The New York and Brooklyn Tunnel for the Rapid Transit Railroad" which appeared in "Compressed Air," June 1904, Volume 9, Number 4, pages 2962 to 2976.

By Mr. HILLIARD.—I offer in evidence page 2975 and also page 2976 of this publication as New York Defendant's Exhibit No. 39.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to another article "Compressed Air Painting Machine." Please fix the date and describe the publication?

A. This is in "Compressed Air" January 1905, Volume 9, Number 11, page 3320.

By Mr. HILLIARD.—I offer a copy of this in evidence as New York Defendant's Exhibit No. 40.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to an article entitled "Ingenious [281] and Effective Air Lift Pump." Please tell us the name of the periodical, date, etc.?

A. This is in "Compressed Air," February 1905, Volume 9, Number 12, pages 3347 to 3349.

(Deposition of Julian A. Sohon.)

By Mr. HILLIARD.—I offer in evidence a copy of pages 3347 to 3355 of this periodical as New York Defendant's Exhibit No. 41.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you another article entitled "A New Method of Pumping Sand by Compressed Air." Tell us about that?

A. This is in "Compressed Air," December 1905, Volume 10, pages 3792 to 3795.

By Mr. HILLIARD.—I offer copy of these pages in evidence as New York Defendant's Exhibit No. 42.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to another article in the same volume entitled "Air White Washer." Please tell us about that?

A. This is in "Compressed Air," February 1906. Volume 10, Number 12, page 3897.

By Mr. HILLIARD.—I offer this in evidence as New York Defendant's Exhibit No. 43.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. Will you refer to the publication "Compressed Air" for 1903, page 2572, and the article therein entitled "Track Tamping with Air Blast" and state the volume in which that occurs? [282]

A. This is in "Compressed Air," September 1903, Volume 8, Number 7.

(Deposition of Julian A. Sohon.)

By Mr. HILLIARD.—I offer this in evidence as New York Defendant's Exhibit No. 44.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. In the same volume, what issue does the matter on pages 2930 and 2331 appear?

A. April 1903, number 2.

By Mr. HILLIARD.—I also offer this in evidence as New York Defendant's Exhibit No. 45.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you an article entitled "Ballast Injector." Will you please tell us where this article appears, date, etc.?

A. In "Compressed Air" June 1897, Volume 2, Number 4, page 234.

By Mr. HILLIARD.—I offer this in evidence as New York Defendant's Exhibit No. 46.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you another volume and call attention to the item "Amond the Notes Descriptive." Will you please name the periodical this appears in, the date, etc.?

A. This is in "Compressed Air" June 1898, Volume 1, Number 4, page 3.

By Mr. HILLIARD.—I offer this in evidence as New York Defendant's Exhibit No. 47.

By Mr. WUPPER.—Same objections. [283]

(By Mr. HILLIARD.)

Q. I show you volume headed Chapter XIII en-

(Deposition of Julian A. Sohon.)

titled "Pneumatic Elevators and Conveyors." What is that volume, date, etc.?

A. This is a book by George Frederick Zimmer entitled "The Mechanical Handling of Material." It was published in 1905 by D. Van Nostrand Company, New York, pages 107 to 116.

By Mr. HILLIARD.—This article including the cut and pages 107 to 116 are offered in evidence as New York Defendant's Exhibit No. 48.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer the following article entitled "Draining a Swamp by Air Lift" appearing at page 7759 of the Compressed Air Magazine for October 1915, Volume 20, Number 10, as New York Defendant's Exhibit No. 49.

By Mr. WUPPER.—Same objections, and also on the ground that the date of the publication is subsequent to the filing date of the patent in suit.

By Mr. HILLIARD.—I next offer in evidence pages 4490 and 4491 of "Compressed Air," June 1907, Volume 12, Number 4, as New York Defendant's Exhibit No. 50.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer in evidence as New York Defendant's Exhibit No. 51, pages 340, 341 and 342 of the "Engineering Record" of March 29, 1913, Volume 67, Number 13.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer in evidence as New York Defendant's Exhibit No. 52, the article in "Engineering News" October 11, 1906, Volume 55,

(Deposition of Julian A. Sohon.)

Number 15, entitled [284] "Grouting a leaking tunnel on the Paris, Lyons and Mediterranean Ry." appearing on pages 374 and 375.

By Mr. WUPPER.—Same objections except as to priority of alleged date.

(By Mr. HILLIARD.)

Q. In connection with the last article, I offer as New York Defendant's Exhibit No. 53, an article in original French, with duly certified translation thereof appearing in "Revue Generale des Chemins de Fer et des Tramways." I will ask Mr. Sohon to continue with description.

A. This article is in Volume XXIX, 1906, Number 1, pages 529 to 539.

By Mr. WUPPER.—Same objections to the publication in the French language and to the translation. The translation will be subject to correction when actually produced.

By Mr. HILLIARD.—I offer the translation of this French article as New York Defendant's Exhibit No. 54.

By Mr. HILLIARD.—I next offer in evidence as New York Defendant's Exhibit No. 55, pages 580, 581 and 582 of the "Engineering News," November 25, 1909, entitled "Lining and Grouting a French Railway Tunnel in Water Bearing Material."

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I next offer as New York Defendant's Exhibit No. 56, the original article in French on this subject from "Revue Generale des Chemins de Fer," March 1909, 22d year, first

(Deposition of Julian A. Sohon.)

part, number 3, pages 167 to 179 and offer as Exhibits pages 171, 172, 173 and 174. [285]

By Mr. WUPPER.—Same objections as to other French publication with the additional objection that it lacks priority.

By Mr. HILLIARD.—I offer in evidence as New York Defendant's Exhibit No. 57, translation of same.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. You have before you a German publication. Will you please tell what it is, its date and the article to which the book is opened?

A. The title of this article is "Die Trockenlegung nasser Tunnelgewolbe and Widerlager" by F. A. Gelbcke. This is in the periodical "Centralblatt der Bauverwaltung," February 21, 1891, pages 73 to 75; February 28, 1891, pages 84 and 85, Volume XI, Numbers 8 and 9.

Q. Is this publication one of general circulation in this line of work? A. Yes.

By Mr. HILLIARD.—This article is offered in evidence as New York Defendant's Exhibit No. 58, and the translation of same is offered in evidence as New York Defendant's Exhibit No. 59.

By Mr. WUPPER.—Same objections as made with reference to the other two French publications and their translations. It is understood that copies of the translations are to be furnished at the same time that the photostatic copies are furnished, is it not?

(Deposition of Julian A. Sohon.)

By Mr. HILLIARD.—Yes.

(By Mr. HILLIARD.)

A. Just refer to the next German publication before you [286] on page 1756 and state the name of the publication, date, and so on?

A. The publication is "Zeitschrift des Vereines Deutscher Ingenieure," December 7, 1901, Volume XLV, Number 49.

By Mr. HILLIARD.—I offer the original in German on page 1756 and 1757 of the article just referred to as New York Defendant's Exhibit No. 60, and also, as New York Defendant's Exhibit No. 61, a translation of so much of said article as relates to the conveyance of material by means of compressed air.

By Mr. WUPPER.—Same objection as made to the last German Article and its translation.

(By Mr. HILLIARD.)

Q. What is this German article before you now?

A. The title of this article is "Wiederherstellung schadhafter Bauweke mittels Einpressens flussigen Zements" by A. Wolfsholz. It is in "Zentrallblatt der Vauverwaltung," October 17, 1903, 23d year, number 83, pages 517 and 518.

By Mr. HILLIARD.—This article in the original is offered in evidence as New York Defendant's Exhibit No. 62, and a translation thereof as New York Defendant's Exhibit No. 63.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you an article appearing in the French

(Deposition of Julian A. Sohon.)

publication and ask you to identify and describe it?

A. The title of this article is "Elevation directe des liquides par l'air comprime" by E. Lemaire. It is in the periodical "Le Genie Civil" of March 19, 1904, [287] Volume XLIV, Number 20, pages 314 to 317.

By Mr. HILLIARD.—This article is offered in evidence as New York Defendant's Exhibit No. 64, pages 314 to 317, inclusive, and a translation thereof is offered as New York Defendant's Exhibit No. 65.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

I show you an article in German entitled "Zeitschrift des Vereines deutscher Ingenieure" dated July 16, 1904, Volume XLVIII, Number 29, pages 1080 and 1801 and ask you to identify that article?

A. This article is by Mr. Wittrock and is on the use of compressed air for raising liquids.

By Mr. HILLIARD.—The article is offered in evidence as New York Defendant's Exhibit No. 66 and a translation thereof as New York Defendant's Exhibit No. 67.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you another article in German and ask you to identify it?

A. The title of this article is "Verfahren zur Ausfuhrung von Arbeiten in Wasserfuhrenden order lockern Gebirgschichten." It is the periodical

(Deposition of Julian A. Sohon.)

"Gluckauf" February 16, 1907, Volume XLIII, pages 202 and 203.

By Mr. HILLIARD.—The original of this article is offered in evidence as New York Defendant's Exhibit No. 68, and a translation thereof is offered in evidence as New York Defendant's Exhibit No. 69.

By Mr. WUPPER.—Same objections and also objection of nonpriority. [288]

(By Mr. HILLIARD.)

Q. Are these foreign publications that you have been referring to books or periodicals or publications of general circulation and reference?

A. They are.

(By Mr. HILLIARD.)

Q. I show you a volume in French entitled "Emploi d'injections de ciment, a l'air comprime, dans les maconneries, terrains de fondations, etc."?

A. The article is in the French periodical "Genie Civil" December 29, 1900, Volume XXXVIII, Number 9, page 145.

By Mr. HILLIARD.—I offer page 145 of this article as New York Defendant's Exhibit No. 76 and I offer as New York Defendant's Exhibit No. 77, the translation of same.

By Mr. WUPPER.—Same objections as to other articles in foreign languages and the translations thereof.

(By Mr. HILLIARD.)

Q. I show you another article in French in the

(Deposition of Julian A. Sohon.)

same journal entitled "Fondations au moyen de l'air comprime experiences de M. Hersant." Can you identify this publication and the article?

A. This is in "Le Genie Civil" September 21, 1895, Volume XXVII, Number 21, pages 327 to 329. The author is L. A. Barbet.

By Mr. HILLIARD.—I offer page 327 of the journal last referred to as New York Defendant's Exhibit No. 78 and the translation of same as New York Defendant's Exhibit No. 79.

By Mr. WUPPER.—Same objections as to other French articles [289] and their translations.

(By Mr. HILLIARD.)

Q. Will you stipulate that the Canniff Patent No. 873,345, New York Defendant's Exhibit No. 83, was subsequent to its issue on December 10, 1907, licensed to the Ransom Concrete Machinery Company to which we have referred heretofore, and that the Ransom Company paid substantial royalties under that patent up to the time of its expiration?

A. I am willing to stipulate that the Ransom Company is reputed to be a licensee of the plaintiff.

By Mr. WUPPER.—I do not have personal knowledge of the license referred to but will stipulate with the defendant's counsel that the Ransom Concrete Machinery Company for a number of years prior to the expiration of the Canniff patent in question was a licensee under that patent for the manufacture of grouting machines in accordance therewith, and was, at the same time, a licensee

under the McMichael Patent in suit for the manufacture of concrete conveying and placing machines.

By Mr. HILLIARD.—I herewith offer pages 35 and 36 of the "Engineering News," January 9, 1902, Volume XLVII, part 2, and especially the article entitled "A Three Hinged Concrete Arch Bridge over the Danube at Ehingen" as New York Defendant's Exhibit No. 104.

By Mr. WUPPER.—Objected to as irrelevant and immaterial and not the best evidence of any date or fact of publication or of any statement therein contained.

By Mr. HILLIARD.—I next offer page 113 of "Engineering News" February 6, 1902, Volume XLVII, Number 6, and particularly [290] the article "Forming foundations in sand or gravel by injecting cement grout" and ask that the same be marked New York Defendant's Exhibit No. 105.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I next offer as New York Defendant's Exhibit No. 106 the article entitled "Improved method of constructing foundation under water by forcing cement into loose sand or gravel by means of air pressure" by F. Neukirch, Bremen, Germany, appearing in the transactions of the American Society of Civil Engineers, Volume XXIX, of September, 1893, pages 639 to 643 inclusive, together with plate No. 1 illustrating the article.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 109 pages 579 to 583 of Transactions of The American Society of Civil Engineers, Volume XXX, December 1893, article entitled "Subaqueous foundations" discussions on paper 623, by C. O. Glein and F. Neukirch.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 110 pages 329, 330, and 331 of the "Engineering Board of March 12, 1904, article entitled "The New York and Brooklyn Tunnel for the Rapid Transit Railroad" and illustrations thereof.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 111 pages 375 to 385 inclusive, being page XXXI of the book entitled "Popular Handbook for Cement and Concrete Users" by Myron H. Lewis and Albert H. Chandler, [291] published by the Norman W. Henly Publishing Company, New York, 1911, chapter entitled "Grout, or Liquid Concrete and its Users."

By Mr. WUPPER.—Same objection, also that the date of the alleged publication is subsequent to the filing date of the patent in suit.

By Mr. HILLIARD.—I next offer as New York Defendant's Exhibit No. 112 an article from the "Engineering Record" for March 4, 1905, pages 232 to 235, inclusive, entitled "Gravity Tunnel for the New Water Works of Cincinnati," by J. A. Hiller.

By Mr. WUPPER.—Same objections except for nonpriority of alleged date.

By Mr. HILLIARD.—I next offer as New York Defendant's Exhibit No. 113 pages 6006 and 6007 of "Compressed Air Magazine" for April 1911, Volume XVI, Number 4, article entitled "Pneumatic Muck Ejector with two stage air supply" with illustration.

By Mr. WUPPER.—Same objections including objections for nonpriority of alleged date.

By Mr. HILLIARD.—I next offer as New York Defendant's Exhibit No. 114, pages 220 and 221 of the "Engineering News" for March 7, 1891, Volume XXV, Number 10, article entitled "A cofferdam or caisson without timber or iron in its construction."

By Mr. WUPPER.—Same objections except objection for lack of priority of alleged date.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 115, pages 163 of the Engineering News of September 12, 1895, Volume XXXIV, Number 11, the article entitled [292] "A new method for securing foundations."

By Mr. WUPPER.—Same objections except as to lack of priority of alleged date.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 116 an article in French in "LeGene Civil" page 237 of September 21, 1895, Volume XXVII, Number 21, article entitled "Fondations au moyen de L'Air Comprime," by

(Deposition of Julian A. Sohon.)

L. A. Barbet, and the translation of this page 527 as New York Defendant's Exhibit No. 117.

By Mr. WUPPER.—Same objections as to the other French publications and their translations.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 118 an article in the original French in "Le Genie Civil" page 145 of December 29, 1900, Volume XXXVIII, Number 9, article entitled "Emploi d'injections de ciment, a l'air comprime dans les maconnories, terrains de fondations, etc." and the translation of same as New York Defendant's Exhibit No. 119.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. Will you please identify pages 10 and 11 of this publication which I show you?

A. This publication is entitled "Construction capacity and cost of operating dredging machines of several types in recent excavations of large magnitude." The author is John Bogart. This paper is communication No. 3 in section 3 of the IX International Navigation Congress and the date of the publication is 1902.

By Mr. HILLIARD.—I offer pages 10 and 11, also title page of this publication as New York Defendant's Exhibit No. 120. [293]

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 121, the full page illustration appearing opposite page 378 of the Engineering News for June 13, 1895, which illustration is entitled

"The Hussey Deliverying Dredge" together with description thereof on pages 379 and 380.

By Mr. WUPPER.—Same objections as to other American Publications.

By Mr. HILLIARD.—Also in the same volume of "Engineering News" for June 13, 1895, I offer the article appearing on pages 384, 385 and 386 and 387 entitled "The handling of dredged material" as New York Defendant's Exhibit No. 122.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 123, pages 2, 3 and 4 of the "Engineering Record" of January 6, 1900, article entitled "The St. Lawrence Power Plant."

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 124, pages 70 and 71 of article entitled "Hains on Reclamation of Potomac Flats" appearing in the "Transactions of the American Society of Civil Engineers," Volume XXXI of January, 1894.

By Mr. WUPPER.—Some objections.

By Mr. HILLIARD.—In the same book pages 492 and 493, I offer as New York Defendant's Exhibit No. 125 the article entitled "Dredging Operations" being a discussion of the preceding paper, in Volume XXXI, dated May, 1894. [294]

By Mr. WUPPER.—Same objections.

(Deposition of Julian A. Sohon.)

Cross-examination.

(By Mr. WUPPER.)

Q. I think you testified before that all statements concerning dates of publications or articles referred to and produced in connection with your testimony are based solely on the fact that they are found in the Library here and bear the dates mentioned?

A. Yes.

Q. How long have you been employed in your present occupation by the Engineering Societies Library? A. Seven years.

2 P. M. Tuesday, September 6th, met pursuant to adjournment:

ADDITIONAL APPEARANCE.

Mr. STEPHEN J. COX, of New York City, for Plaintiff.

By Mr. HILLIARD.—I wish to notify the plaintiff's counsel that Robert A. Shailer, a material witness for the defense herein, is now in Europe and I am reliably informed that he will not be in New York until the middle of September and that therefore proper proceedings will be taken by the defendant's counsel to secure his testimony and have it introduced into the case on behalf of the defendant.

By Mr. COX.—The materiality of Mr. Shailer's testimony is not conceded and the reservation which defendant's counsel attempts to make is not consented to. [295]

DEPOSITION OF JAMES McILVRID, FOR DEFENDANT.

JAMES McILVRID, defendant's witness, whose deposition was taken at New York City on September 6, 1927.

My name is James McIlvrid; I am 61 years of age and reside at 42 Armstrong Ave., Jersey City; I am a master mechanic. I have followed the mechanical line of work since 1891. I am a son of William McIlvrid to whom a patent was issued on May 7, 1910, No. 958,421, on an application filed November 2, 1905, for a grout mixer. My father died between eight and nine years ago. I am familiar with the machine shown and described in the patent mentioned. It was known as a grout mixer.

(Note: Patent offered by defendant's counsel as New York Defendant's Exhibit No. 97.)

Q. Were any machines ever manufactured according to this patent? A. Yes, sir.

By Mr. COX.—One moment. The question is objected to because it calls for an interpretation of the patent [296] by the witness and has not been shown that it is the intent to make such an interpretation.

(By Mr. HILLIARD.)

Q. Are you familiar with drawings of the machine? A. Yes, sir.

Q. You have used them a great deal?

A. Yes, sir, all my life.

(Deposition of James McIlvrid.)

Q. And you are familiar with specifications of the machine? A. Yes, sir.

Q. You have used them all your life?

A. Yes, sir.

Q. What was your first knowledge of this machine that you testified about, the grout mixer, and by whom was it manufactured?

A. Manufactured by the Cockburn Barrow Machine Company first.

Q. And your position there was what?

A. Foreman machinist when I started there.

Q. And that was when? A. 1906.

Q. How long did you continue as foreman of the plant?

A. About ten years,—as foreman you mean?

Q. Yes? A. One year.

Q. And after that? A. Superintendent.

Q. When did you go to work there?

A. In the fall of 1906.

Q. Were they manufacturing these grout mixers that you testified about when you went there?

A. They were. [297]

Q. Was there any time during that period when you weren't manufacturing or when not prepared to manufacture these grout machines?

A. No, we were always prepared to manufacture them.

Q. Can you estimate the probable number of them that you manufactured during the ten years you were there, just an estimate?

(Deposition of James McIlvrid.)

A. I should say *15p* or 200 machines.

Q. And were all these machines sold?

A. Yes, sir, every one of them.

Q. Do you know whether they were used?

A. Yes, sir, they were used.

Q. Have you any record showing the type of these machines being manufactured when you went to the work there in 1906? A. No record.

Q. Have you any drawings showing them?

A. Only the ones you have there on file.

Q. You refer to these blue-prints that I exhibit to you marked 1-109-D and 1-110-D?

A. Right, I do.

Q. Do these blue-prints correctly show the construction of the grout mixers made by this concern in 1906? A. Yes, they do.

By Mr. HILLIARD.—I will ask to have these blue-prints temporarily marked for identification, that which bears the date January 30, 1904, being marked the New York Defendant's Exhibit No. 98 for identification and that bearing the date February 9, 1904, being marked New York Defendant's Exhibit No. 99 for identification. [298]

Q. I notice on these drawings under the dates the initials H. C. L. Who is H. C. L.?

A. He was chief draftsman.

Q. What was his name?

A. Harry C. LePorte.

Q. How long have you known Mr. LePorte?

A. Since 1906.

(Deposition of James McIlvrid.)

Q. Was he connected with the Cockburn Barrow Company when you went there?

A. He was.

Q. In what capacity? A. Chief draftsman.

Q. Do you know what these drawings show, and if so just briefly state what the two drawings are?

A. The drawings show the plans of hydraulic grout mixers 21x36.

Q. Was that what was known as the "Standard 21"? A. Yes, sir.

Q. What general differences are there between these two drawings?

A. One is 21x36 and the other 21x22 has a shorter body.

Q. Which represents the larger machine?

A. The 21x36.

Q. And this is the one which is marked Exhibit No. 98 for identification?

A. Yes, that is the one, No. 98.

Q. Did you get out any catalogues in which this machine was illustrated or were there any catalogues at the plant illustrating them when you got there? [299]

A. Yes there was a little brown catalogue that sort of illustrated them.

Q. I show you a catalogue bearing the name Cockburn Barrow Machine Company and designated thereon as Catalogue "C" and ask you what you know about it?

A. The only thing I know is that it is the Cock-

(Deposition of James McIlvrid.)

burn Barrow Company catalogue and shows cuts of the various machines they manufactured.

Q. Was that catalogue in existence before you went there in 1906? A. Yes, sir.

Q. Does it illustrate either of the machines shown in the drawings of 1904 and identified here as New York Defendant's Exhibits No. 98 and No. 99 for identification?

A. This one doesn't show the grout mixer at all. (Upon inspection it was found that pages 7 to 18 inclusive of this catalogue were missing.)

Q. Were these concrete mixers known under any general trade name?

A. Cockburn Grout Mixers is all I ever knew them by.

Q. Have you ever heard the expression "Cockburn & Barrow Mixers"?

A. The Cockburn and Barrow Mxers, yes.

Q. Did you put out any other mixers of any sort or were any being put out at the time you went to work there?

A. Not when I went to work there. There was only the standard grout mixer manufactured but we afterward built the larger one with the larger discharge.

Q. How long did you continue with the Cockburn Barrow Company? [300]

A. About twelve years.

Q. And did it always retain that name?

A. No—Cockburn Barrow Machine Company,

(Deposition of James McIlvrid.)

the Cockburn McIlvrid Company and the Standard Gas Power Company.

Q. What became of the Standard Gas Power Company?

A. Just petered out, that was all.

Q. Do you know who purchased its assets?

A. No, the building was purchased by the Marine Supply Company of Jersey City.

Q. Do you know whether they sold it to anybody?

A. They sold the building to the Ault and Waborg Company, ink manufacturers.

Q. Are these grout mixers as made by the Cockburn Barrow Company being manufactured to-day?

A. Yes, sir.

Q. By whom? A. By the Union Iron Works.

Q. Where are they located? A. Hoboken.

(Direct examination closed.)

Cross-examination.

(By Mr. COX.)

Q. Are you familiar with the construction of the grout mixers being made to-day by the Union Iron Works? A. No.

Q. Do you know how long the Union Iron Works have been making grout mixers?

A. I judge in the neighborhood of twelve years.

Q. The grout mixer made by the Union Iron Works is a vertical machine without blades or paddles in it. Do you [301] know that? A. No.

Q. Do you now recall when the Cockburn Barrow Company failed?

(Deposition of James McIlvrid.)

A. The Cockburn Barrow Company didn't fail, the old partners died and they just turned it into another company.

Q. What was the name of the other company?

A. Cockburn McIlvrid.

Q. When did that concern fail?

A. I don't know as any of them failed. I think the Standard Gas Power was the only one that failed.

Q. Don't you recall that the Cockburn Barrow Company went into the hands of a receiver?

A. Yes, I do. My father was receiver.

Q. And about when was that?

A. That must have been about fifteen years ago.

Q. That would be about 1912?

A. Yes, I judge about that.

Q. In your deposition given in the case of Concrete Mixing and Conveying Company against Stone and Webster Incorporated in June of the present year, did you not testify as follows:

"Q. When did the Cockburn Barrow Company fail?

A. I don't know just what year it was.

Q. Well, about what year?

A. Let's see, I think it was about 1914.

Q. You think it was about 1914?

A. Yes." [302]

I show you copy of your deposition?

A. Well, I would say now it was in that neighborhood. I can't tell you just exactly when it was.

By Mr. COX.—Answer is objected to as not responsive.

(Deposition of James McIlvrid.)

Q. Did you or did you not so testify?

A. I did.

By Mr. COX.—That is all.

Redirect Examination.

(By Mr. HILLIARD.)

Q. I show you a photostat of certain machines bearing the legend Defendant's Exhibit No. 100, page 16, and ask you whether or not that is a copy of a page that was found in the Cockburn Barrow, catalogue "C" that you have just testified about?

A. Yes, sir, it is an exact copy of the original.

Q. Does this page that you have just referred to illustrate either of the machines shown in the drawings of 1904 which you have identified as New York Defendant's Exhibits No. 98 and No. 99 for identification?

A. It only shows the end view and the side elevation of the standard machine.

Q. What do the code words at the bottom of this photostat indicate?

A. Indicates the size of the machine.

Q. Does this photostat represent the products that were being manufactured by Cockburn Barrow up to the time you went to work for them in the fall of 1906? A. Yes, sir.

By Mr. HILLIARD.—I offer in evidence the catalogue "C" of [303] the Cockburn Barrow Machine Company as New York Defendant's Exhibit No. 100 and the copy of page 16 that has just been referred to as New York Defendant's Exhibit No. 100–A.

(Deposition of Harry C. LePorte.)

By Mr. COX.—Let me see that, will you? You mean the pictures?

By Mr. HILLIARD.—Yes.

By Mr. COX.—Objected to as wholly immaterial and irrelevant. [304]

DEPOSITION OF HARRY C. LePORTE, FOR DEFENDANT.

HARRY C. LePORTE, defendant's witness, whose deposition was taken at New York City on September 7, 1927.

My name is Harry C. LePorte; I am 52 years of age; residence, Mountain View, New Jersey; occupation, mechanical engineer.

I am connected with the Union Iron Works, Hoboken, New Jersey; I have been connected with that concern nearly ten years. Immediately prior to being connected with the Union Iron Works I was with the Dover Boiler Works, Dover, New Jersey, H. B. Arden, Engineer. We were engaged in private propositions. Atkins Filter Press Corporation, they were in New York City, and prior to that with the Cockburn Barrow Machine Company and their successors, they being under four different corporate names while I was with them. These names were The Cockburn Barrow Company, the Cockburn McIlvrid Corporation and the Standard Gas Power Corporation.

I was with the General Chemical Company for one year. I first went to work for the Cockburn Barrow Company in 1903, either in August or Sep-

(Deposition of Harry C. LePorte.)

tember. They were located out in 11th St., Jersey City, between Cowes and Erie Streets. I was associated with the Cockburn Barrow Company first as draftsman, latter as chief draftsman, engineer, assistant works manager.

I was entirely familiar with the machinery which the Cockburn Barrow Company was making. They made so-called grout mixers. My first knowledge of that grout mixer was as follows: I was handed by Mr. McIlvrid, who was manager at the time, some rough pencil sketches showing the idea, and in a sketchy way the construction desired, and told to put in shape for construction. I put it in shape for construction by making drawings. The first machines were built on sketches. After one or two had been constructed and we found the construction and operation satisfactory enough, we made detailed drawings. I can't state exactly when the first machine of this description was made, but late in 1903 or very early in 1904. [305]

The machine consisted essentially of a steel plate cylinder—steel plate horizontal cylinder—with a shaft running through the cylinder longitudinally carrying paddles for the mixing of the material. The shaft passing through stuffing boxes on the heads of the machine to prevent air leakage. There was a dome mounted on the top of the cylinder and an opening in the top of the dome for filling the machine. When it was desired to eject the material from the machine the door in the top of the charging dome was closed, then compressed air ad-

(Deposition of Harry C. LePorte.)

mitted to the cylinder through a pipe opening close to the top of the cylinder. This air pressure forces the door of the charging dome against its seat giving a tight seal against leakage of air. The air pressure acting on the surface of the material in the cylinder forced the material out through the discharge pipe which entered the cylinder at the bottom—at the bottom of one of the heads—and forced the material to the right location through a hose connected with this outlet pipe just mentioned.

The shaft which carried the paddles was located in the cylinder longitudinally on the center line of the cylinder, that is on the axis. The standard size of the air pipe for admission of air to the cylinder was, I think, one-inch, the standard size of the outlet pipe was two inches. [306]

Q. I show you a blue-print which is marked New York Defendant's Exhibit No. 98 for Identification, and ask you to state what you know about that blue-print?

A. That's a print from the original tracing made on this grout mixer.

Q. Did you make the original tracing?

A. I did.

Q. How does it happen that this Exhibit No. 98 marked for identification, bear the name Union Iron Works?

A. The old Cockburn Barrow Company being out of business, the Union Iron Works tried this machine along with several other products of the Cockburn Company, and the drawings and patterns

(Deposition of Harry C. LePorte.)

used in this machine were acquired by the Union Iron Works after which they erased the old Cockburn Barrow Company name and inserted their own on the face of it. It can be seen by close inspection of the print that the Union Iron Works is lettered in over an erasure. The old letters showing faintly on the print.

Q. When was the original of this blue-print, Exhibit No. 98 for Identification, made? [307]

A. This is the original tracing. It is dated January 30, 1904. It was made about that time. It's barely possible that the drawing may have been antedated a little but not at a date previous to construction of machines. There is in the Engineering Record of March 12, 1904, an article regarding the subway tunnel in which appears a description and cut of this machine. That assembly drawing we have before us was originally made for use in connection with that article, very shortly before the publication of that article which as I stated was in March 1904.

Q. I further show you a blue-print marked New York Defendant's Exhibit No. 99 for Identifications, and ask you what you know about that blue-print?

A. Well, the statements that I have made regarding the other print would apply to this one absolutely, the only difference being that this is a little smaller machine, the cylinder being 22 inches long instead of 36 inches.

Q. This is the short one? A. Yes.

(Deposition of Harry C. LePorte.)

Q. Are these two blue-prints which I have just shown you, are they present day working drawings of the Union Iron Works?

A. In all essential detail. There have been various changes from time to time, changes we considered cheapened the manufacture a little, gave readier access to certain parts which required renewal from time to time, also some changes which afforded a longer life to certain wearing parts.

By Mr. WUPPER.—Objected to as not responsive and voluntary. [308]

(By Mr. HILLIARD.)

Q. Are you willing to allow the original drawings to pass out of your own possession?

A. The original drawings are in the files of the Union Iron Works and they would retain those as part of their record.

Q. Are they willing to allow them to leave their possession and go to California?

A. They are not.

By Mr. HILLIARD.—I offer in evidence the two blue-prints New York Defendant's Exhibits No. 98 and No. 99 for Identification, as New York Defendant's Exhibit No. 98 and No. 99 respectively.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

(By Mr. HILLIARD.)

Q. Do you know whether any catalogue was published by the Cockburn Barrow Company illustrating and advertising these grout mixers?

(Deposition of Harry C. LePorte.)

A. There was.

Q. Can you produce one?

A. There is a copy here from my personal files known as catalogue "C."

Q. Do you know when this catalogue was first published?

A. I will have to study a little before giving a definite answer to this question.

Q. Take your time and answer it.

A. It was published about 1906, I should judge about 1906, I know it was about that time.

By Mr. HILLIARD.—I offer the catalogue produced by the witness in evidence as New York Defendant's Exhibit [309] No. 100–B.

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

(By Mr. HILLIARD.)

Q. Is the grout mixer shown in New York Defendant's Exhibits No. 98 and No. 99, which are the two blue-prints illustrated in this catalogue?

A. The same machine shown on page 16 of the catalogue.

Q. Is the air inlet shown in that catalogue?

A. Yes, in the lower left-hand view. The pipe shown at the upper part of the cylinder is the air inlet.

Q. Will you mark the air inlet with the words "Air Inlet"? A. Witness complies.

Q. Is the grout outlet shown on page 16 of the catalogue?

(Deposition of Harry C. LePorte.)

A. It is in the same view at the lower part of the cylinder.

Q. And will you mark that "Grout Outlet"?

A. Witness complies.

Q. Are all those three views on page 16 of the catalogue this same machine? A. They are.

Q. You have referred to having made some of these grout machines or of some of them having been made before the drawings New York Defendant's Exhibits No. 98 and No. 99—that is the blue-prints were made—did you make other machines like this after that?

A. Do you mean the same machine?

Q. Yes, after the blue-prints were made?

A. We made a great many of them.

Q. Did you make any in 1905 and 1906?

A. Yes, that was about the time when the business on these [310] machines was most active.

Q. Does the Union Iron Works make them today? A. They do.

Q. Has the Union Iron Works any catalogues illustrating these grout mixers? A. They have.

Q. Is this Bulletin 63 that I show you one of them?

A. It is. Figures 38 and 39 in this Bulletin 63 of the Union Iron Works show the same machine with the constructional modifications which I have referred to previously.

Q. Will you read the printed matter on the pages showing figures 38 and 39 and state whether or not

(Deposition of Harry C. LePorte.)

the statements of this printed matter are true and correct?

(Appearance—Mr. Stephen J. Cox, of New York City, for Plaintiff.)

A. (Witness reading.) I believe every statement there to be absolutely correct.

By Mr. COX.—The question and answer are objected to as obviously incompetent because relating to matters beyond the knowledge of the witness. They are also objected to as irrelevant and immaterial.

(By Mr. HILLIARD.)

Q. Is your position with the Union Iron Works such as to make you familiar with the specifications of the grout mixers found in figures 38 and 39? A. It is.

Q. And with the mode of operation of such grout mixers? A. It is.

Q. Does knowledge of these things that I have asked you about pertain to your duties in the Union Iron Works? A. They do. [311]

Q. To what extent is it necessary for you to understand the practical operation of this machine?

A. You mean to what extent in my business connection with the Union Iron Works?

Q. Yes.

A. Why, as I stated before I made the original drawings of the machine in 1904 for the Cockburn Barrows Machine Company, practically all the constructional changes and modifications since that date have been either made personally or super-

(Deposition of Harry C. LePorte.)

vised by me. I am thoroughly familiar with the machine in all its detail, in fact I am in charge of the engineering work of the Union Iron Works.

Q. I notice here that it says that the mixing drum of the grout mixer in figures 38 and 39 is 21 inches diameter by 36 in length. Are those inside or outside dimensions? A. Inside.

Q. I notice that the weight is given as 1350 pounds. What does that represent?

A. Total weight of the machine with skids and engine for driving the machine.

Q. Do you know the approximate weight of the engine? A. I think about 180 pounds complete.

By Mr. HILLIARD.—I offer this catalogue, "Bulletin 63" of the Union Iron Works and particularly the page bearing figures 38 and 39 in evidence as New York Defendant's Exhibit No. 101.

By Mr. COX.—Objected to as immaterial and irrelevant and incompetent, and in support of this objection the copyright date of the Exhibit—1926—is noted. [312]

(By Mr. HILLIARD.)

Q. Now, referring to this Cockburn Barrow Mrchine Company catalogue "C" which is Defendant's Exhibit No. 100–B, do you know whether or not the machine shown on page 16 was ever built for mixing and ejecting anything besides grout?

A. (Witness examines catalogue "C.") We at one time made on special order one of those machines, standard size and construction, except that the grout outlet pipe was a larger size to permit

(Deposition of Harry C. LePorte.)

the passage of stones, the user using it for ejecting concrete instead of grout mixture which the machine was designed for.

By Mr. COX.—Objected to as largely incompetent and mere hearsay.

(By Mr. HILLIARD.)

Q. You know that that machine was actually built of your own knowledge? A. It was.

Q. You saw it made? A. I did.

Q. Do you recall what the size of the outlet on that machine was?

A. It was either 2½ or 3 inch pipe size.

Q. Was that same order for this special machine ever duplicated?

A. Not duplicated, but we received a successive order for a machine of exactly the same type and construction in somewhat larger size from the same customer.

Q. In this Cockburn Barrow catalogue "C," Defendant's Exhibit No. 100–B, there is illustrated and described on pages 12 and 13 a concrete mixer style "B." Did [313] you make such machines or were such machines being made when you went there?

A. Yes, they, the Cockburn Company, had been engaged in the manufacture of that machine for some years before my engagement with them and continued to build them to some extent after I was engaged with them.

Q. Do you know whether the machine shown on page 16 of New York Defendant's Exhibit No.

(Deposition of Harry C. LePorte.)

100-B and in the drawings, New York Defendant's Exhibits No. 98 and No. 99, which are the blueprints, was ever patented?

A. It was—the patent was issued to William McIlvrid.

Q. Do you recognize the patent before you do number 958,421—particularly the drawings?

A. That is the same machine regarding which I have been testifying.

Q. You are referring to McIlvrid patent 958,421, are you? A. I am.

Q. I understood you to say that many of these Cockburn Barrow mixers were built and put into use. Do you recall any special big order?

A. One from the O'Rourke Engineering Construction Company shortly after they started construction of the Pennsylvania Railroad Tunnel. That order was for 24 machines.

Q. Do you remember when they were used?

A. I should judge the latter part of 1905 or early in 1906.

Q. Were those machines that were sold to the O'Rourke Engineering & Construction Company used over any considerable period of time on the Pennsylvania Tunnels?

A. They were used during the entire construction of the tunnel. [314]

Q. Did you personally see them used there?

A. I did a number of times.

Q. I show you a page which has plate 41 in the Transactions of the American Society of Civil En-

(Deposition of Harry C. LePorte.)

gineers, Volume LXVIII, number 1155, September, 1910, and ask if there is anything shown in that page that you recognize?

A. This grout mixer to which my testimony refers is shown here very clearly.

Q. Is that a Cockburn Barrow Grout Mixer?

A. It was.

Q. Which figure in that page do you refer to?

A. The lower one.

Q. What does that illustration indicate is taking place?

A. It is evident that they are engaged in discharging the machine at the time the picture was taken.

Q. Where is the material being introduced?

A. It is being introduced through a grouting hole which is provided in the cast iron lining plates for the purpose.

Q. What grouting conduit or connection is there between this grouting hole and pipe and the tunnel pipe and the mixer?

A. As shown here, a hose connection.

Q. Where is the hose connection?

A. The hose is shown at the left of the operator who is introducing the hose nozzle into the grouting hole of the lining plate. Also as shown, curves round back of the operator and appears again next to the outlet pipe of the machine.

By Mr. HILLIARD.—I offer in evidence a photostat copy of the page of the Translations of the American Society [315] of Civil Engineers

(Deposition of Harry C. LePorte.)

which has just been referred to as New York Defendant's Exhibit No. 103.

By Mr. HILLIARD.—That is all.

By Mr. COX.—It is noted that this photostat purports to be pages 256 and the following page of volume LXVIII, number 1155, September 1910, and the exhibit and all the testimony relating to it are objected to as not the best evidence, and as irrelevant and immaterial, and relating to something which occurred several years after the application for the patent in suit. This objection does not modify the stipulation heretofore made for the use of photostat copies.

Cross-examination.

(By Mr. COX.)

Q. Just where are you employed in the Union Iron Works—in what part of their plant?

A. Chiefly in the office.

Q. And what are your particular duties there?

A. Engineering work, designing, estimating, preparation of charts, drawings and checking subordinates, and also keeping a general eye on construction in the shop to see that the drawings are conformed to, that is a general check on the workshop foreman.

Q. What is the size of the plant of the Union Iron Works?

A. You mean the number of employees?

Q. And size of plant?

A. As nearly as I can judge the number of em-

(Deposition of Harry C. LePorte.)

ployees at the present time would be about fifty. The plant could accommodate 175 employees. Any more details desired?

Q. No, I think that's enough. And do you manufacture [316] the various articles enumerated on the cover of the catalogue which has been offered in evidence as Exhibit No. 101?

A. We do.

Q. Do you make anything else than these enumerated articles?

A. A great deal of special work to customers' drawings and specifications.

Q. That is to say, outside of your regular line, is that what you mean?

A. Well, outside of the standard articles enumerated in the catalogue. Of course we consider the special work for customers one of our regular lines.

Q. Are the books of the Cockburn Company prior to 1914 in existence? A. I don't know.

Q. You haven't been asked to look them up?

A. I have not.

Q. In June last when you gave your deposition in the suit of the Concrete Mixing and Conveying Company against Stone & Webster Incorporated, you stated that you were unable to recall who it was that ordered a machine like that shown in the blue-prints, Exhibits No. 98 and No. 99, with the 2½ or 3-inch discharge opening. Have you looked that up since?

A. There was no means by which I could look it up.

(Deposition of Harry C. LePorte.)

Q. Then you are unable to give us the name of the person who ordered that.

A. I am still unable to do so.

Q. You understand that they issued an order to the Cockburn [317] Barrow Machine Company. Are you able to give us the date of that order?

A. Not very accurately, but it must have been late in 1907 or early in 1908.

Q. In your former deposition given about three months ago, you gave the date as "The winter of 1908 or 1909 or the winter of 1909 or 1910," did you not? I show you copy of your testimony.

A. May I dream over that a minute?

Q. The question is whether you said that or not?

A. I assume from its appearing in the record that that is what I said at the time.

Q. Do you not remember that you gave that answer at that time?

A. No, I can't say—I remember answering the question—I could not state accurately what the dates were—it was simply a question of memory anyway.

Q. You have no doubt that you did so testify in your last deposition, have you?

A. No, I have no doubt that the record is correct.

Q. Then how do you know how to account for the difference in dates between your present testimony and your testimony three months back?

A. Possibly I answered the question to-day a little too quickly without stopping to consider sufficiently.

(Deposition of Harry C. LePorte.)

Q. You have no way of fixing that date?

A. Nothing except memory.

Q. Have you any way of fixing the date of the order for 24 grouters for use in the Pennsylvania Tunnel?

A. Not very closely. Of course, the date on which the [318] O'Rourke Engineering & Construction Company started to set tunnel lining rings could be determined. The use of the machines undoubtedly began at that date and the order placed with the Cockburn Company I remember was placed at amply sufficient time prior to the date they would start using them to allow for construction of the machines.

Q. Do you recall when the Pennsylvania Tunnel was completed, that is to say the lining of the tunnel? A. Do I recall the date when completed?

Q. Yes? A. I don't.

Q. Can you recall the year?

A. I don't think I better make any statement on that,—no, I have no accurate recollection of that.

Q. Now, when did the Cockburn Company fail?

A. They wound up their business—that is their successor, the Standard Gas Power Corporation—wound up their business in 1915.

Q. Well, when did the Cockburn Company pass into the hands of a receiver?

A. Either 1912 or 1913.

(Deposition of Harry C. LePorte.)

Q. In your said deposition given in June last you testified: "They passed into the hands of a receiver in I think 1911 and were succeeded by the Cockburn McIlvrid Corporation"—did you not? I show you your testimony.

A. That is my testimony, is it?

Q. Yes. The question is just whether you gave that testimony? A. That is my testimony. [319]

WITNESS.—Pardon me, may I correct that testimony on that point?

By Mr. COX.—Go right ahead; yes.

WITNESS.—I was figuring back before. The only way I could locate it was remembering where I lived the day they went into receivership and I was figuring back the length of time. I now make it 1911 after figuring with pencil and paper.

(By Mr. COX.)

Q. Now the Cockburn Company or at least its receiver effected a compromise with the creditors of the corporation during the receivership, did it not?

A. I couldn't say. The financial affairs were not my business, I'm an engineer.

Q. Did the Cockburn McIlvrid Corporation purchase the assets of the Cockburn Company from the receiver?

A. I know nothing about it except that they succeeded to the business of the Cockburn Company.

Q. The plant was closed down for a time, was it not? A. Not to my knowledge.

(Deposition of Harry C. LePorte.)

Q. Was it run by the receiver?

A. It was. It might be proper in view of the questions you are asking me now, to state that during the time the Cockburn Company was under the Cockburn Company organization I left the company and was engaged with the General Chemical Company in New York for one year. I returned to the Cochran McIlvrid Corporation after about one year, so that there were some matters during that year of which I have no knowledge. [320]

Q. Now the catalogues of the Cockburn Barrow Machine Company marked Exhibits No. 100 and No. 100–B both have missing pages, the first, pages 7 to 18 inclusive and the second, pages 7 and 8. Is that correct?

A. That seems to be correct. Regarding this catalogue marked 100–B that is from my own personal files this morning. I can testify that pages 7 and 8 have nothing whatever to do with grout mixers, concrete machinery or anything of the kind—they were wheel barrel pages.

By Mr. COX.—Answer objected to as not responsive and voluntary—and question repeated.

Q. Now the catalogues of the Cockburn Barrow Machine Company marked Exhibits No. 100 and No. 100–B both have missing pages, the first, pages 7 to 18 inclusive and the second, pages 7 and 8. Is that correct? A. It is.

Q. Can you give us the date of the publication of these catalogues marked Exhibits No. 100 and No. 100–B?

(Deposition of Harry C. LePorte.)

A. Not more accurately than what I have already testified to.

Q. Well just add the date, will you?

A. It was to the best of my recollection somewhere around 1906.

Q. On pages 12 to 15 inclusive of this catalogue there appear illustrations of concrete mixers (offering catalogue to witness). Did the Cockburn Company make mixers of that character?

A. (Witness examining catalogue.) They did.

Q. Just tell us briefly how these mixers operated?

A. The style "B" mixer illustrated on page 12, the essential features of the machine are the mixing box [321] at the rectangular cross-section shown, the charging hopper is shown in the upper cut on the left hand end of the machine. The mixing box revolves on the supporting rollers shown, carries the material over and up as it revolves and allows it to drop. There was a shaft running through the mixing box longitudinally carrying a worm at the left hand in the bottom of the charging hopper, the worm feeding the materials at the bottom of the charging hopper into the mixing box and this shaft also carried a few paddles which assisted in the mixing operation and assisted in feeding the material through the discharge end of the machine at the right. The distinctive feature of this machine was that it had a continuous mixer—the material being fed into the hopper, mixed and discharged continuously. The mixer shown on page 14 is merely a cylindrical

(Deposition of Harry C. LePorte.)

box with an opening in one side as shown, the material dumped into the box, the cover closed and clamped and the material mixed by revolving the box and opening the door turning the box over to bring the door opening low on one side and the material discharged from the box by turning it over slowly. It is a rather crude machine, but the phototype of some of the more efficient modern machines.

Q. How was the concrete discharged in the machine first described by you which was made by the Cockburn Company?

A. Simply by the material being fed in and passing through the mixer box forced the material along through the mixing box, the mixing box being set on a slight angle inclining downward towards the discharge end to assist in the feeding in that direction. [322]

Q. That is the concrete was discharged from both of these mixers made by the Cockburn Company by gravity, is that correct?

A. Gravity only. [323]

DEPOSITION OF CLINTON H. CROOKS, FOR DEFENDANT.

CLINTON H. CROOKS, defendant's witness, whose deposition was taken in New York City, September 7, 1927.

My name is Clinton H. Crooks; I am 46 years of age; my address is 609 West 137th St., New York City. I am a construction engineer with Rosoff

(Deposition of Clinton H. Crooks.)

Subway Construction Company, New York City. I have followed the engineering profession for 25 years. I am not a graduate of an engineering institute. I have had experience with grouting. After it was made we conveyed it to the place where it was to rest, where we desired to put it. My experience with the use of a compressed air in conveying grout dates from April, 1906, and it was used prior to that date on the same piece of work but I wasn't connected with it before that. The job to which I refer was known at that time as the Battery Tunnel, subway tunnel, from Bowling Green to Borough Hall, Brooklyn, Bowling Green being in Manhattan. It was a supaqueous tunnel under the East River. We utilized air pressure for placing the grout back of the east iron lining tubes. That was one use. It is standard practice on subaqueous work to use what we call a blow pipe for the removal of water in the heading or air chamber. That water and sand, small stones and stuff is conveyed out through the pipe of air by air pressure on the surface. You have a construction tunnel which is under air pressure and the minute you open your blow line anything near it if it is small enough will come out through the blow pipe.

The type of grout machine which I used on this job was a horizontal cylinder shaped machine with revolving paddles inside, the opening being on the top through a hole or hatch, the door of which was hinged inwardly. You opened the door, you

(Deposition of Clinton H. Crooks.)

dropped it, and let it hang vertically. After putting in your cement and water by raising the door and turning on the air [324] the air would hold the door tight, these paddles would revolve in the machine for mixing the grout and after a minute or two of mixing you opened up your valves and let the air pressure blow the grout out of the [325] machine through a flexible hose connection to what we called grout plugs in the cast-iron lining of the tunnel—blow the grout on the outside of the cast-iron lining. I think the manufacture of the machine that I used was Cockburn and Barrow, and I think Jersey City was their address.

Q. I show you catalogue "C" of the Cockburn Barrow Machine Company which is New York Defendant's Exhibit No. 100–B and call your attention to page 16. Does the illustration on page 16 show the machine which you used on that job?

A. (Witness examining same.) Yes, sir.

Q. In your work on the Battery Tunnel, did you ever have any other experience particularly with the operation of compressed air in conveying anything other than grout, water or muck or sand?

A. Yes, sir, we had an accident there in 1905, in which a man was blown up through the river bottom through the cover over the top of the tunnel and through the water above the cover on the top of the tunnel. He went through an approximate distance of about twelve feet of muck and about the same amount of water on top of it. He was picked up on the surface of the river by means

(Deposition of Clinton H. Crooks.)

of a rowboat. This occurred on the Brooklyn side some little distance out from the bulkhead. The tubes at that point were located between two piers. This man came up in the slip between the two piers.

By Mr. HILLIARD.—That is all.

By Mr. COX.—No cross-examination. [326]

OFFER OF EXHIBITS BY COUNSEL FOR DEFENDANT.

A certified copy of the file-wrapper and contents of McMichael patent No. 1,127,660 was admitted in evidence as Defendant's Exhibit 134.

A certified copy of the file-wrapper of the Leake patent No. 1,215,558, dated February 13, 1917, application filed October 7, 1907, was admitted in evidence, over the objection of plaintiffs' counsel that the exhibit was irrelevant and immaterial and was marked Defendant's Exhibit 135.

An assignment from the patentee Leake to the plaintiff was admitted in evidence over the objection of plaintiff's counsel that the exhibit was irrelevant and immaterial, as Defendant's Exhibit 136.

Counsel for defendant offered in evidence a certified copy of the file-wrapper of Buzzell and Larkin patent No. 951,754 and a certified copy of the file-wrapper of Buzzell and Larkin patent No. 894,813. Their admission in evidence was objected to by counsel for plaintiff on the ground that they are immaterial and irrelevant. The objection was

sustained, the file-wrappers were excluded from evidence and were marked for identification respectively, as Defendant's Exhibits 137 and 138. [327]

Mr. TOWNSEND.—Now, there was another interference that McMichael was involved in, and that was with one W. W. Darley, who filed his application December 30th, 1907; that interference I have here was between like subject matter, as the Patent Office held, and as a part of the *res gestae*—as a part of the co-pending application and as interpretative of the patent, I offer a certified copy of the file-wrapper and contents of this Darley application, and it is particularly pertinent in this, your Honor—

Mr. WILIAMS.—(Interrupting.) May I first interpose my objection?

The COURT.—This is all being tried through the Court and this all goes in anyhow in one form or another, and the Court will not consider it if there is an objection unless it is competent and material. What is the object of this?

Mr. TOWNSEND.—The object is this, for two things. There is a certified copy of the so-called preliminary statement of Leake claiming to be the inventor of the same subject matter that is involved here. The claims in here are directed to a so-called group machine. Darley has the same construction that Leake has. However, Darley's application was directed to the handling of a dry material, such as grain, and this is to show, your Honor, the analogy between the handling of ma-

terials wet and dry, and that it is the expression of the Patent Office experts that there was interfering subject matter. That is something that has never been brought out in any litigation and never has been developed, and it is essential that if this case goes further that the analogy between different devices for carrying away by [328] compressed air, independent of the particular use to which it is put should be shown. I offer this in evidence, your Honor, as Defendant's Exhibit 139.

Mr. WILLIAMS.— * * * I object to its receipt.

The COURT.—Sustained.

Mr. TOWNSEND.—Exception.

The COURT. — Exception allowed. Proceed. As far as the analogy is concerned, I suppose there are many of them of which judicial knowledge or judicial notice will be taken if they exist. Proceed.

(Whereupon certified copy of file-wrapper of Darley for patent marked Defendant's Exhibit 139 was denied in evidence.)

Mr. TOWNSEND.—I next offer a proof of patent, copies of which I have had certified, by reason of the fact that we were unable to make a stipulation with the other side that uncertified printed or photostatic copies could be offered, a stipulation which is so common in patent cases.

The first patent I offer as Defendant's Exhibit 140 is a patent by Smith, 122,497, January 2d, 1872. The next I offer as Exhibit 141, is a patent by Smith, No. 122,498, January 2, 1872.

* * * The third patent is that of Goodrich Exhibit 142, on a method of repairing tunnels. No. 317,337, May 5th, 1885—to show the state of the art.

The next is Goldie, Exhibit 143, on the use of a semititious (cementitious) mixture for blasting, No. 676,128, June 11, 1901. Exhibit 143 is Goldie's patent, 676,129, June 11, 1901. One is the method and the other is the apparatus. The last is Exhibit 144. [329] The next is 145, and that is Goldie's patent 707,840, August 26, 1902, which is a method and means of tamping railway tracks by compressed air using cement and cemititious (cementitious) mixtures. The first two patents of Goldie's are for wet mixtures. The third patent of Goldie is for a dry mixture. The next, Exhibit 146, which is Moir, improvement in apparatus for forcing lime grout, cement and the like, No. 778,878. That is January 3, 1905—a horizontal gun.

(Whereupon certified copy of Smith patent 122,497 dated Jan. 2, 1872, was admitted in evidence as Defendant's Exhibit 140; Certified copy of Smith patent Jan. 2, 1872, 122,498 was admitted in evidence as Defendant's Exhibit 141; Certified copy of Goodrich patent No. 317,337, May 5, 1885, was admitted in Evidence as Defendant's Exhibit 142; Certified copy of Goldie's patent No. 676,128, dated June 11, 1901, was admitted in evidence as Defendant's Exhibit 143; Goldie Patent No. 676,191 dated June 11, 1901 was admitted in evidence as Defendant's Exhibit 144; certified copy of Goldie patent 707,840, dated August 26, 1902, was admitted in

evidence as Defendant's Exhibit 145; and Moir patent No. 778,878, dated Jan. 3, 1905 was admitted in evidence as Defendant's Exhibit 146.)

Mr. TOWNSEND.—The next is a patent by Tucker. That is 147, and the patent number is 820,747, May 15, 1906, Method of and apparatus for lining tunnels with concrete. The next is the Williams and Brown Exhibit 148—

Mr. WILLIAMS.—May I inquire whether the Tucker is set up in the answer? It is my recollection that it is not.

Mr. TOWNSEND.—It may be that one or two of these are not noticed, in which case they are only received to show the state of the art.

Mr. WILLIAMS.—I object to their use, of course, for any other purpose.

The COURT.—Yes. [330]

(Whereupon Tucker patent, 820,747, May 15th, 1906, marked Defendant's Exhibit 147, and denied.)

Mr. TOWNSEND.—I started to offer exhibit 148, Williams & Brown, 829,903, Aug. 28, 1906, a machine for handling material for tunnel arch construction.

Mr. WILLIAMS.—I make the same objection to that patent. I think that is not set up and we have had no notice of it.

The COURT.—Sustained.

(Whereupon Williams & Brown patent 829,903, Aug. 28, 1906, was marked Defendant's Exhibit 148 and denied in evidence.)

Mr. TOWNSEND.—The next is Exhibit 149, patent to Canniff, No. 873,345, issued Dec. 10, 1907,

with the application filed October 29th, 1906. A certified copy of that file-wrapper and contents will establish the date of the application of Canniff to be a date prior to the McMichael patent—a prior invention—and that is a pneumatic grout and mixing and discharging apparatus. That is a substantial disclosure of everything that is in the plaintiff's patent.

(Whereupon Canniff patent No. 873,345 dated Dec. 10, 1907, was admitted in evidence and marked Defendant's Exhibit No. 149.)

The next is a certified copy of Buzzell and Larkin's patent, Exhibit 150, No. 894,813, dated August 4, 1908, for a concrete conveyor employing the compressed air method.

Mr. WILLIAMS.—If the Court please, I should like to object to the receipt of this last patent in evidence for several reasons.

Mr. TOWNSEND.—The patent could not be pleaded as a prior invention because it was not applied for. It could not be a prior publication, your Honor, nor a prior patent, [331] but if you will look on page 9, you will see "J. W. Buzzell, Boston, Massachusetts; East Orange, New Jersey, and elsewhere in the United States," and "W. J. Larkin, New Haven, Connecticut; at Laport, Ind., and elsewhere in the United States," and this file-wrapper and patent are essential to explain and show what the Buzzell and Larkin prior invention was. You appreciate, I am sure, the difference between prior invention and prior publication.

It was not a prior publication. It was not a prior patent because it was later—

The COURT.—(Interrupting.) Objection sustained to the last offer. Proceed.

(Whereupon certified copy of Buzzell and Larkin's patent was marked Defendant's Exhibit 150 and admission into evidence denied.)

Mr. WILLIAMS.—May I understand that the same objection applies to the Tucker and the Williams and Brown patents, neither of which was set up in the bill of particulars. I make the same objection on the same ground.

Mr. TOWNSEND.—I offered them to show the state of the art.

* * * * * * * * *

The COURT.—Speaking of the depositions, the different exhibits—whatever exhibits were introduced in the depositions will be received but not otherwise. Objection sustained.

Mr. TOWNSEND.—Those patents are offered to show the state of art.

The COURT.—I understand. Take your exception and proceed.

Mr. TOWNSEND.—The next is the patent to McIlvrid 958,421, May 17, 1910, on an application filed November 2d, 1905. That is exhibit 151 the prior invention date being [332] November 2d, 1905.

(Whereupon certified copy of McIlvrid patent No. 958,421, May 17, 1910, was admitted in evidence as Defendant's Exhibit 151.)

(Whereupon certified copy of Pohle patent No. 487,639 Dec. 6, 1892, was admitted in evidence as Defendant's Exhibit 152.)

(Whereupon Saunders' patent 597,023 dated Jan. 11, 1898, was admitted in evidence as Defendant's Exhibit 153.)

Mr. TOWNSEND.—Then the Whisler patent, Exhibit 154, No. 669,197, dated March 5, 1901.

Mr. WILLIAMS.—I make the same objection as to the Whisler patent, on the same ground.

The COURT.—That is not mentioned in the bill of particulars?

Mr. WILLIAMS.—No.

The COURT.—Sustained.

(Whereupon Whisler patent No. 669,192, dated March 5, 1901, was marked Defendant's Exhibit 154 and its admission denied.)

Mr. TOWNSEND.—In the mining of sulphur out of a large number of Frasch patents we offer simply two related patents, No. 799,642, dated Sept. 19, 1905, as Exhibit 155, and as exhibit 156,800,127, dated September 19th, 1905.

(Whereupon Frasch patent No. 799,642, dated Sept. 19, 1905, and Frasch patent No. 800,127, dated Dec. 19, 1905, were admitted in evidence as Defendant's Exhibit 155 and 156 respectively.)

Then patents on the dredging and the McMichael principle of treating a material not concrete but of the same consistency as concrete in a closed chamber by air on top and expelling jet.

(Whereupon Duckham patents 4,400, dated Dec. 18, 1875, and Duckham Patent 15,348, dated Dec. 14,

1885, were admitted in evidence as Defendant's Exhibits 157 and 158 respectively.) [333]

(Whereupon Sickles' patent 99,360 dated Feb. 1, 1870, was admitted in evidence as Defendant's Exhibit No. 159.)

(Whereupon Rix & Donahoo patent, 635,270 dated Oct. 17, 1899, was admitted in evidence as Defendant's Exhibit 160.)

(Whereupon Church patent No. 487,606, dated Dec. 6, 1892, was admitted in evidence as Defendant's Exhibit 161.)

Mr. TOWNSEND.—Then patent to Fisher will be Exhibit 162—Fisher Patent 584,864, of June 22, 1907.

Mr. WILLIAMS.—To which we object on the ground that it is too late and on the ground that it is not set up in the bill of particulars.

The COURT.—Sustained.

Mr. TOWNSEND.—We offer to show the state of the art, your Honor.

(Whereupon Fisher patent 584,864 dated June 22, 1907, was marked as Defendant's Exhibit 162 and its admission denied.)

(Whereupon patent of Frizell, 233,499 dated October 19, 1880, was admitted in evidence as Defendant's Exhibit 184.)

(Whereupon Harris patent 759,100, dated May 3, 1904, and Harris patent 814,601 dated March 6, 1906, were admitted in evidence as Defendant's Exhibits 164 and 165 respectively.)

(Whereupon Warren patent 671,302, dated April

2, 1901, was admitted in evidence as Defendant's Exhibit No. 166.)

(Whereupon Butler patent 660,946 dated October 30, 1900, was admitted in evidence as Defendant's Exhibit No. 167.)

(Whereupon Kolsche patent 18,394, dated October 16, 1881, was admitted in evidence as Defendant's Exhibit 168.)

(Whereupon Hussey patent No. 497,427, dated May 16, 1893, and Hussey Patent No. 526,530, of September 25, 1894, were admitted in evidence as Defendant's Exhibits 169 and 170 respectively.) [334]

Mr. TOWNSEND.—Of a closed receptacle type with air pressure on materials to be ejected, displacement by air pressure with ejector—is the Henning patent, exhibit 171, No. 609,744 of August 23, 1898.)

Mr. WILLIAMS.—To which we object upon the ground that it is not set up in the bill of particulars, nor, as I recall, in the answer.

The COURT.—If that is the situation, the objection will be sustained.

(Whereupon Henning Patent No. 609,744, of August 23, 1898, was marked for identification Defendant's Exhibit 171.) [335]

TESTIMONY OF JOSEPH C. ROWELL, FOR DEFENDANT.

JOSEPH C. ROWELL, defendant's witness.

My name is Joseph C. Rowell. My age is 74; my residence is Oakland, California, and according to

(Testimony of Joseph C. Rowell.)

the register of the University of California, I am Librarian Emeritus and University Archivist. I have been connected with the University of California's Library since July 1, 1875. I am entirely familiar with the records of the University. These records have been under my control. The Library has in the past, and particularly prior to 1906, kept its records of books received.

The books received by the University Library from 1875 to 1911 were entered in what we called "accession books," a series of folio volumes in which on the left leaf in the first column was a series of numbers like 300,000, 300,411, 300,412, 300,413—an accession of numbers. The second column gave the date of the receipt into the library. Then followed the name of the author. Then the title of the book and on the opposite page the place of publication, the date of printing, the color of the binding, the size of the book and the agent from whom we purchased it, and the price that was paid for it, and that gave a complete history of the book and how we got hold of it.

Until 1898 this work was done by me personally in my own handwriting. From about that time some assistant or clerk in the Library did it under my directions. [336]

Q. I show you a bound volume of photographic reproductions of various publications and I will ask you if you have examined those. I will ask you whether or not you have ascertained whether the

(Testimony of Joseph C. Rowell.)

originals or any of them are in the archives of the library of the University of California.

A. Yes, sir. Almost all of them are volumes in the University of California, and I have examined them personally and compared each photostat with the volume from which it was photographed and can testify that they are exact copies without addition, subtraction or amendation.

Q. Now, please take that and state if you know when the originals of these various publications were received at the University of California library?

A. No. 20 was received at the University in 1907.

Mr. WILLIAMS.—Could you give the date, if I may interrupt?

The WITNESS.—The date of that is October 20, 1906, from the "Engineering Record."

Mr. WILLIAMS.—No. 20—are they to be desig-dated— [337] may I ask counsel—by number?

Mr. TOWNSEND.—The same number by which they were offered by the witnesses in New York.

Mr. WILLIAMS.—I have the same objection—if later they are to be offered—I shall object now on the ground that the date is too late to be material.

Mr. TOWNSEND.—Well, your Honor, these publications were all offered in New York in connection with Mr. Sohon's deposition in regard to the Engineering Society's Library. It so happens that the Engineering Society's Library is in New York, where we could only obtain these things and make the searches to discover the art—they had not been

(Testimony of Joseph C. Rowell.)

received there or the library was not in existence at a time anterior to the art.

The COURT.—What is the object of this publication?

Mr. TOWNSEND.—It shows the art of conveying material by compressed air.

Mr. WILLIAMS.—The witness said that it was received in October, 1907.

The WITNESS.—Yes, sir.

Mr. WILLIAMS.—Months after the date of the McMichael application. It is too late.

Mr. TOWNSEND.—I don't think that he said that.

The COURT.—He said that it was received in 1907 and it was dated October 20, 1906.

Mr. TOWNSEND.—These are scientific publications.

The COURT.—I know, but what is the object of it if it is within two years of the application of the McMichael patent?

Mr. TOWNSEND.—It is prior to the McMichael [338] invention. These are offered to show the state of the art prior to the McMichael invention. We have been put to a tremendous expense to bring a witness here to prove things which anybody would stipulate.

The COURT.—When does that go from—the McMichael invention?

Mr. TOWNSEND.—From January 14, 1907.

Mr. WILLIAMS.—My objection, however, is that there is no evidence now of this publication being of

(Testimony of Joseph C. Rowell.)

a date earlier than the date when this witness knows of it, which he said was in 1907.

The COURT.—Very well, it will be received over objection. If it is competent, it will receive consideration; if not, it will be ignored.

(Whereupon the "Engineering Record" Volume 54, October 20, 1906 (pages 424 to 427 inclusive) was admitted in evidence as Defendant's Exhibit No. 20.)

The WITNESS.—No. 21 is an extract from the "Railroad Gazette," printed April 20, 1906, and received by us in 1906.

(Whereupon "Railroad Gazette" dated April 20, 1906, was admitted in evidence as Defendant's Exhibit No. 21.)

The WITNESS.—No. 22 is a photostatic copy of an article appearing in "Engineering Contracting" dated October 10, 1907, and received by us in 1908.

Mr. WILLIAMS.—We object to that.

Mr. TOWNSEND.—That particular thing is offered in explanation of and descriptive of the Florida operation, to which we have referred in the depositions. [339]

Mr. WILLIAMS.—If the Court please,—

The COURT.—Are you objecting?

Mr. WILLIAMS.—I am objecting.

The COURT.—Sustained.

Mr. TOWNSEND.—Objection.

(Whereupon "Engineering Contracting," dated October 10, 1907, was marked for identification Defendant's Exhibit No. 22 and its admission denied.)

(Testimony of Joseph C. Rowell.)

The WITNESS.—No. 23, an article from the "Scientific American," May 18, 1907, received by us in 1907.

Mr. WILLIAMS.—I make the same objection. It is too late.

Mr. TOWNSEND.—For the same reason, it is explanatory of the Florida work—part of the *res gestae.*

The COURT.—Well, it seems to be before the date of your application.

Mr. WILLIAMS.—No, your Honor, it is later.

The COURT.—Sustained.

(Whereupon article from "Scientific American," May 18, 1907, was marked Defendant's Exhibit No. 23 and its admission in evidence denied.)

Mr. TOWNSEND.—Exception.

The WITNESS.—Exhibit No. 24 is an extract

(Whereupon extract from the "Railway Age" of April 19, 1907.

Mr. WILLIAMS.—I make the same objection.

The COURT.—Sustained.

Mr. TOWNSEND.—It relates to the same subject matter, your Honor. Florida work. [340]

(Whereupon extract from the "Railway Age" of April 19, 1907 was marked as Defendant's Exhibit 24 and its admission denied.)

The WITNESS.—Exhibit No. 25 is a reprint or a photostatic copy of the "Engineering News" of October 19th, 1905, received by us in 1907.

(Whereupon "Engineering News" dated Octo-

(Testimony of Joseph C. Rowell.)

ber 19, 1905, was admitted in evidence as Defendant's Exhibit No. 25.)

The WITNESS.—A reprint from the proceedings —the transactions of the American Society of Civil Engineers received by us—I do not see the date on here but received by us in March, 1886. So that was before the time.

(Whereupon transactions of the American Society of Civil Engineers was admitted in evidence as Defendant's Exhibit No. 26.)

The WITNESS.—Exhibit No. 27, an extract from the same society's transactions, received by us in 1894.

(Transactions of the American Society of Civil Engineers admitted in evidence as Defendant's Exhibit No. 27.)

The WITNESS.—Exhibit No. 28, proceedings, I think of the same institution, received by us in May, 1896.

(Whereupon minutes of the proceedings of the Institution of Civil Engineers were admitted in evidence as Defendant's Exhibit No. 28.

The WITNESS.—Defendant's Exhibit No. 29 from the same proceedings, received by us in April, 1888. [341]

(Whereupon minutes of the proceedings of the Institution of Civil Engineers, was admitted in evidence as Defendant's Exhibit No. 29.)

The WITNESS.—Exhibit No. 30, received by us in September, 1896.

(Testimony of Joseph C. Rowell.)

(Minutes of the proceedings of the Institution of Civil Engineers admitted in evidence as Defendant's Exhibit No. 30.)

The WITNESS.—Exhibit No. 31, received by us in 1896.

(Whereupon minutes of the proceedings of the Institution of Civil Engineers were received in evidence as Defendant's Exhibit No. 31.)

The WITNESS.—Exhibit No. 32, received by us in 1918, but it was published in the transaction of the Institution of Naval Architects—that is an English Society—in March, 1898. The book did not actually come to our library until 1918.

Mr. WILLIAMS.—I think to that one I shall interpose the objection that the testimony of this witness does not establish a date earlier than 1918, and I object to it on that ground.

The WITNESS.—The date was on the paper itself.

The COURT.—Sustained.

(Whereupon transactions of the Institution of Naval Architects, were marked Defendant's Exhibit 32 and admission denied.)

The WITNESS.—Exhibit No. 48 received by us in 1916.

Mr. WILLIAMS.—I make the same objection to it. It [342] is too late.

The COURT.—Sustained.

(Whereupon book by George Frederick Zimmer, entitled "The Mechanical Handling of Material"

(Testimony of Joseph C. Rowell.)

was marked Defendant's No. 48, and admission denied.)

The WITNESS.—Exhibit 51, in the "Engineering Record," received by us in 1913; date of publications,—

Mr. WILLIAMS.—(Interrupting.) I make the same objection. It is too late.

The COURT.—Sustained.

The WITNESS.—The date of publication appears as photographed, March 29, 1913.

(Whereupon Engineering Record of March 29, 1913, was marked Defendant's Exhibit 51 and its admission denied.)

The WITNESS.—Exhibit 52 from the "Engineering News" received by us in 1906. The date of that is October 11, 1906.

(Whereupon "Engineering News" of October 11, 1906, was marked Defendant's Exhibit 52 and its admission denied.)

The WITNESS.—Exhibit 58, an extract from a German periodical, "Zentralblatt der Bauverwaltung" dated February 21, 1891, and received by us in 1903.

(Whereupon "Zentralblatt der Bauverwaltung" of February 21, 1891 was admitted in evidence as Defendant's Exhibit 58.)

The WITNESS.—Exhibit 59 is a translation of the same into the English language.

(Whereupon translation of Exhibit No. 58 was admitted in evidence as Defendant's No. 59.) [343]

(Testimony of Joseph C. Rowell.)

The WITNESS.—Exhibit No. 60 is a reprint from the German publication "Zeitschrift des Vereines deutscher Ingenieure." The date of the publication is—I do not know what it is, I have not got it noted down here, but we received it in 1901.

(Whereupon the German publication "Zeitschrift des Vereines deutscher Ingenieure" was admitted in evidence as Defendant's No. 60.)

The WITNESS.—Exhibit No. 61 is a translation into English of this article.

(Whereupon translation of Exhibit No. 60 was admitted in evidence as Defendant's No. 61.)

The WITNESS.—No. 62 is from a German publication "Zentrallblatt der Bauverwaltung." Dated October 17, 1903, and received by us in the same year, 1903.

(Whereupon German periodical "Zentrallblatt der Bauverwaltung" of October 17, 1903, was admitted in evidence as Defendant's Exhibit No. 62.)

The WITNESS.—Exhibit No. 63 is a translation into English of this article.

(Whereupon translation of Exhibit No. 62 was admitted in evidence as Defendant's Exhibit No. 63.)

The WITNESS.—Exhibit No. 64 is an article appearing in the French journal, "Le Genie Civil." Civil Engineer, I suppose that is. The date of that—it does not appear on the thing, but we received it in 1904.

(Whereupon article from the French journal

(Testimony of Joseph C. Rowell.)

"Le Genie Civil" was admitted in evidence as Defendant's Exhibit No. 64.)

The WITNESS.—Exhibit 65 is a translation into [344] English of this same article.

(Whereupon translation into English of Exhibit No. 64 was admitted in evidence as Defendant's Exhibit No. 65.)

The WITNESS.—Exhibit No. 66 is another French article—I mean a German article. It is from the minutes of the meeting of the Cologne Section of the Union of German Engineers, and that took place February 10, 1904. This particular book was received by the library in 1904.

(Whereupon minutes of the meeting of the Cologne section of the Union of German Engineers February 10, 1904, were admitted in evidence as Defendant's Exhibit No. 66.)

The WITNESS.—Exhibit No. 67 is a translation into English of this same article.

(Whereupon translation of Exhibit No. 66 was admitted in evidence as Defendant's Exhibit No. 67.)

The WITNESS.—Exhibit No. 68 is a German periodical called "Gluckauf"—all one word. The date of that is February 16, 1907, and it was received by our library the same year, 1907.

Mr. WILLIAMS.—I object to that one on the ground that it is too late.

The COURT.—Sustained.

(Testimony of Joseph C. Rowell.)

(Whereupon the German periodical "Gluckauf" February 16, 1907, was marked Defendant's Exhibit No. 68 and its admission denied.)

The WITNESS.—Exhibit 69 is a translation into English of the same article. [345]

Mr. WILLIAMS.—I make the same objection.

(Whereupon translation of Defendant's Exhibit No. 68 was marked Defendant's No. 69 and its admission denied.)

The WITNESS.—An article from the Engineering News dated November 25, 1909, received by the library in 1909.

Mr. WILLIAMS.—I make the same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—That it is too late.

The WITNESS.—Exhibit No. 80 was the—

Mr. WILLIAMS.—(Interrupting.) Was the last one may I ask, 79?

The COURT.—70, it must be.

The WITNESS.—Article from the "Engineering News" dated November 25, 1909, that is number 71.

Mr. TOWNSEND.—That is a description of the machine by Buzzell and Larkin.

(Whereupon article from "Engineering News," dated November 25, 1909, was marked Defendant's Exhibit No. 71 and its admission denied.)

The WITNESS.—Then exhibit No. 80, that is McKnight—that is Knights' American Mechanical Dictionary—from the Knights' Mechanical American Dictionary, received by the library in 1914.

(Testimony of Joseph C. Rowell.)

Mr. WILLIAMS.—I make the same objection as too late.

Mr. TOWNSEND.—Just a minute, your Honor, That Knight's Mechanical Dictionary is a book that you know as well as I do, and the original of that book I have had for over twenty-five years, and if you want me to [346] take the stand to prove its publication—it is a book issued in 1883, a standard text-book—I have had this particular book for twenty-five years.

The COURT.—Produce it. Objection sustained to this since it is made.

(Whereupon Knights' Mechanical American Dictionary was marked Defendant's Exhibit 80 and its admission denied.)

The WITNESS.—Exhibit 82—it is not in our University library.

Mr. TOWNSEND.—Just pass that.

The WITNESS.—Exhibit No. 83, "Engineering Record" of June 8, 1907, received by us in 1907.

Mr. WILLIAMS.—I make the objection that it is too late.

The COURT.—Sustained.

(Whereupon "Engineering Record" of June 8, 1907, was marked Defendant's Exhibit No. 83 and its admission denied.)

Mr. WILLIAMS.—I shall withdraw my objection to Knight's Mechanical Dictionary, because I don't want to be captious, but as the witness is testifying, we cannot know what he is talking about except by number. We will check that up later,

(Testimony of Joseph C. Rowell.)

but if what he refers to as having been received in 1914 is Knight's Mechanical Dictionary of a date—that is, published at a date prior to 1907, I am willing to withdraw my objections as to that item.

Mr. TOWNSEND.—I brought the volume with me.

Mr. WILLIAMS.—You won't need to leave it here as far as I am concerned. [347]

(Whereupon Defendant's Exhibit No. 80 was admitted in evidence.)

The COURT.—Proceed.

The WITNESS.—Exhibit 103, transactions of the American Society of Civil Engineers, received by us in October, 1910.

Mr. WILLIAMS.—I object to that on the ground that it is too late.

The COURT.—Yes.

Mr. TOWNSEND.—It is descriptive of the McIllvrid machine.

The COURT.—Sustained.

(Whereupon transactions of the American Society of Civil Engineers were marked Defendant's Exhibit 103 and its admission denied.)

The WITNESS.—Exhibit 105 is from the "Engineering News" of February 6, 1902, received by us in 1902.

(Whereupon "Engineering News," February 6, 1902, was admitted in evidence as Defendant's Exhibit No. 105.)

(Testimony of Joseph C. Rowell.)

The WITNESS.—Exhibit No. 106 from the transactions of the American Society of Civil Engineers—what is this date? It is so small. I would like to have both counsel see that. My eyesight is not very good.

Mr. TOWNSEND.—September 18, 1893, take a look at that.

Mr. WILLIAMS.—What is the date of its receipt, is that the date of its receipt?

Mr. TOWNSEND.—No, the date of publication.

Mr. WILLIAMS.—That is not important. 1893 I read [348] that.

The WITNESS.—1893 I read that. That was received by the University Library in 1893.

(Whereupon transactions of the American Society of Civil Engineers, September 1893, was admitted in evidence as Defendant's Exhibit No. 106.)

The WITNESS.—Exhibit No. 109 from the same Society's transactions, received by us in 1894.

(Whereupon transactions of the American Society of Civil Engineers of December, 1893, was admitted in evidence as Defendant's Exhibit No. 109.)

The WITNESS.—Exhibit No. 110, from the "Engineering Record" of March 12, 1904, received by us in 1904.

(Whereupon transactions of the "Engineering Record" of March 12, 1904, was admitted in evidence as Defendant's Exhibit No. 110.)

The WITNESS.—A "Popular Hand Book for

(Testimony of Joseph C. Rowell.)

Cement and Concrete Users," published in 1911, received by us in 1911.

Mr. WILLIAMS.—To that one I object on the ground that it is too late.

The CLERK.—May I inquire the number.

Mr. WILLIAMS.—What is the number, the Clerk asks?

The WITNESS.—No. 111. Exhibit No. 111.

(Whereupon "Popular Hand Book for Cement and Concrete Users" was marked Defendant's Exhibit 111 and its admission denied.)

The WITNESS.—Exhibit No. 112, from the "Engineering Record" of March 4, 1905. Received by us in 1905.

(Whereupon "Engineering Record" of March 4, 1905 was admitted [349] in evidence as Defendant's Exhibit No. 112.)

The WITNESS.—Exhibit No. 114, from the "Engineering News" of March 7, 1891, received by us in 1891. I put that on the second one instead of on the reverse of the first page. I put that on the second by turning over two leaves at once.

(Whereupon "Engineering News" of March 7, 1891 was admitted in evidence as Defendant's Exhibit No. 114.)

The WITNESS.—Exhibit 115, from the "Engineering News" of September 12, 1895, received by the University Library in 1895.

(Whereupon "Engineering News" of September 12, 1895 was admitted in evidence as Defendant's Exhibit No. 115.)

(Testimony of Joseph C. Rowell.)

The WITNESS.—An article from "Le Genie Civil" received subsequent to 1895, but before 1900. I cannot exactly find out the exact date of the receipt of that for some reason or other.

(Whereupon "Le Genie Civil" of September 21, 1895, was admitted in evidence as Defendant's Exhibit 116.)

The WITNESS.—Exhibit No. 117 is a translation of this article.

(Whereupon the translation of Exhibit 116 was admitted in evidence as Defendant's Exhibit 117.)

The WITNESS.—Exhibit No. 118 from the "Le Genie Civil" received by us in 1901.

(Whereupon "Le Genie Civil" of December 29, 1900, was admitted in evidence as Defendant's Exhibit No. 118.) [350]

The WITNESS.—A translation of the same is exhibit 119.

(Whereupon translation of Exhibit No. 118 was admitted in evidence as Defendant's Exhibit No. 119.)

The WITNESS.—Exhibit No. 121. This is a plate taken from the supplement to the "Engineering News" of June 13th, 1895. Received by us in 1895. And certain texts belonging to the same article.

(Whereupon plate and text from "Engineering News" of June 13, 1895, were admitted in evidence as Defendant's Exhibit No. 121.)

The WITNESS.—Exhibit No. 122. "Engineering News" of June 13, 1895, received by us in 1895.

(Testimony of Joseph C. Rowell.)

(Whereupon "Engineering News" of June 13, 1895, was admitted in evidence as Defendant's Exhibit No. 122.)

The WITNESS.—Exhibit No. 123. From the "Engineering Record" of January 6, 1900. Received by us in 1900.

(Whereupon "Engineering Record" of January 6, 1900, was admitted in evidence as Defendant's Exhibit No. 123.)

The WITNESS.—Exhibit No. 124—your memorandum will show what that is from. Let me see. I have it, 124.

Mr. WILLIAMS.—Are you going to testify from something you know of your own knowledge?

The WITNESS.—Yes, that is to say, I have found the exact volume from which this photograph was taken and compared it as to date and everything about it so that it is absolutely accurate.

Mr. WILLIAMS.—I gather that you did not know about [351] this when you were going—

The WITNESS.—Well, I do not think that perhaps the name of the periodical is very essential, but I see from what it is. It is from the transactions of the American Society of Civil Engineers, Volume 31 of January, 1894, pages 70 and 71, received by us in April, 1898.

(Whereupon transactions of the American Society of Civil Engineers, of January, 1894, was admitted in evidence as Defendant's Exhibit No. 124.)

(Testimony of Joseph C. Rowell.)

The WITNESS.—The last exhibit is No. 125, from the same transaction, received by us in April, 1898—the same month.

(Whereupon transactions of the American Society of Civil Engineers, April, 1898, was admitted in evidence as Defendant's Exhibit No. 125.)

Q. Mr. Rowell, when you receive periodicals, what is your method of marking their accession?

A. It has not always been uniform. We have usually stamped the name of the library on the first page and perhaps on the plates, and had—in certain years we have stamped the date, also. But usually when these single numbers of periodicals come—suppose it is a weekly periodical, we have to wait until the end of that volume is complete and the title page and index have been received from the publisher and then we send it to the binder, so that the actual receipt in the library may be subsequent—as a bound volume. The actual receipt as a bound volume may follow a few weeks or a few months, or even if binding money is very scarce— [352]

The COURT.—(Interrupting.) I do not see that all this is essential.

The WITNESS.—Yes.

The COURT.—I do not think there is any question about these.

Mr. TOWNSEND.—Yes.

The COURT.—Anything further with this witness?

Mr. TOWNSEND.—Just a second.

(Testimony of Joseph C. Rowell.)

Q. You have come to Seattle especially for the purpose of giving the testimony you have given?

A. Yes, sir.

Q. And you have come at the expense of the defendants' haven't you? A. Yes, sir.

Mr. TOWNSEND.—That is all.

The COURT.—You may cross-inquire.

Cross-examination.

(By Mr. WILLIAMS.)

Q. Can you make translations of these German and French articles yourself?

A. Not sufficiently correct to be satisfactory.

Q. You don't—

A. (Interrupting.) I read German, French, Italian and Spanish—various languages—

Q. (Interrupting.) You do not pose as an interpreter for the purpose of vouching for the correctness of these interpretations?

A. Not entirely.

Q. Translations? [353] A. Not entirely.

Q. You do not assume the responsibility, then, for the correctness of them? A. No, sir.

Mr. WILLIAMS.—That is all.

Mr. TOWNSEND.—That is all.

Mr. TOWNSEND.—These exhibits are all in evidence, your Honor.

Mr. TOWNSEND.—They are in evidence in connection with the New York depositions. If not, I will offer them again, but they have all been offered and marked.

The COURT.—Proceed.

(Testimony of H. L. Terwilliger.)

The COURT.—Any objection?

Mr. WILLIAMS.—I should like the opportunity because the testimony has not given it, to examine these—to determine whether they are set up in the bill of particulars and if not to offer any objection upon that score.

The COURT.—They may be admitted now, and if you find any that are not in the bill of particulars bring it to the attention of the Court. Your next witness. [354]

TESTIMONY OF H. L. TERWILLIGER, FOR DEFENDANT.

H. L. TERWILLIGER, defendant's witness.

My name is H. L. Terwilliger; my age is 53 and I live at Palo Alto, California. I am district manager for the Ingersoll-Rand Company of San Francisco. The Ingersoll-Rand Company is in the compressor business—air compressors, that is, machinery that uses compressed air. I have been engaged in the business dealing with air compressors and air compressing apparatus since the fall of 1897. [355]

Q. What has been your experience in that connection since that time?

A. When I left college, Cornell University, I had a thesis on the testing of high pressures under compressed air in New York first made by the Ingersoll Sargeant Drill Company and when I got out of college I went to the shops of the Ingersoll Sargeant Drill Company, in 1897 and worked there one

(Testimony of H. L. Terwilliger.)

year. After that one year, later in the fall of 1898, I went to their New York office and worked in the capacity of engineer and later as a salesman, and later as assistant to the General Manager in the sales end. That was Mr. Saunders and in 1901 I went to Europe for five years for the same company and in 1906 I came back and about mid-year I came to San Francisco and went into the general machinery business, that company handling the Ingersoll-Rand line which was formed in the meantime, and I stayed in that capacity until 1915, and since that time I have been district manager for the Ingersoll-Rand Company at San Francisco.

Q. Did you graduate from Cornell University?

A. I did.

Q. With what degree?

A. Why, they gave me the mechanical engineering degree at that time.

Q. Have you any knowledge as to extent compressed air was used for transporting mobile substances, say, prior to 1900.

A. Prior to 1900?

Q. Yes. A. No, only what I read. [356]

Q. Well, what knowledge—what familiarity did you have with the subject of compressed air apparatus prior to 1900?

A. From the time I made my thesis test and somewhat before, 1897, I had occasion to read about compressed air a great deal and when I made those tests I had to study them, and after I went with the Ingersoll Rand Company, I received a magazine called "Compressed Air."

(Testimony of H. L. Terwilliger.)

Q. Well, were you familiar with the general state of development of compressed air apparatus prior to 1900? A. Well, yes.

Q. And did you continue to keep in touch with the general development of such apparatus thereafter? A. I did.

Q. Please compare the general conditions as respect the efficiency and operation of compressed air apparatus at a period around about 1900 and at a period of 1906 or 1907.

Mr. WILLIAMS.—I object to that question as being utterly immaterial and irrelevant.

The COURT.—What is the purpose?

Mr. LOFTUS.—The purpose, your Honor, is to show the general rapid development of compressed air apparatus during that period, as in answer to any contention by the plaintiff—

The COURT.—(Interrupting.) Well, you have shown it by your patents or publications that that is a fact. I cannot see where the witnesss is in any better position to testify about that. He can read, and the rest of us can read. The objection is sustained. [357]

Q. Can you state to what extent the—state whether or not there was any increase in the general growth or development of compressed air apparatus and the methods of its application during that period between 1900 and 1906?

Mr. WILLIAMS.—If the Court please, if this is of any possible significance, it is a matter not only of judicial knowledge, but universal knowledge. I object.

(Testimony of H. L. Terwilliger.)

The COURT.—Yes, sustained.

Q. Have you—you stated something about keeping in touch with the development of the compressed air field through magazines and the like, and I will ask you in that connection, what magazines you have read.

A. Well, I have read particularly—

Mr. WILLIAMS.—If the Court please, I think that is immaterial. If there is a publication let us have it.

The COURT.—Sustained.

Mr. LOFTUS.—This is preliminary, your Honor.

The COURT.—Sustained. Proceed with the examination of the witness.

Q. Are you familiar with the magazine called "Compressed Air"? A. I am.

Q. How long have you known of it.

Mr. WILLIAMS.—I object, your Honor. If the magazine has got something, prove the magazine and its state.

The COURT.—Sustained.

Mr. LOFTUS.—We are going to offer the magazine, your Honor, and I am just laying the foundation.

The COURT.—You do not need any foundation on that. [358] Proceed with it, if you have anything to offer in the way of publications.

Q. I show you a volume containing various parts of a magazine entitled "Compressed Air" and ask you if you are familiar with it? A. I am.

(Testimony of H. L. Terwilliger.)

Q. How long have you known it—known of it?

Mr. WILLIAMS.—I object, your Honor. The significant thing is, when was it published?

Mr. LOFTUS.—It is not of significance when it was published if this witness has known of it prior to the date of this patent in suit.

The COURT.—The magazine may have existed a thousand years and it may not be material to this patent. Objection sustained. Proceed.

Mr. LOFTUS.—If I can establish the date, there are certain parts we want to offer.

The COURT.—Proceed.

Mr. LOFTUS.—I would like to offer this volume, certain parts of this volume in evidence, and by this witness to prove the age of the magazine.

The COURT.—The magazine may have existed for years. Prove the date of your publication. If you have any purpose that you want to offer it for, prove the date of your publication.

Mr. LOFTUS.—I am offering this volume, your Honor, and by this witness propose to prove that it was in existence prior to 1907.

Mr. WILLIAMS.—I object to its receipt until it is properly identified. There is no identification and [359] it is incompetent.

The COURT.—Can you prove by this witness that these were published prior to 1907?

Mr. LOFTUS.—I am asking the questions.

The COURT.—I say, can you interrogate?

Mr. LOFTUS.—Yes.

The COURT.—Well, proceed to do it; not simply ask him how long the magazine is in existence.

(Testimony of H. L. Terwilliger.)

Mr. LOFTUS.—I am asking him how long he has known of the magazine.

The COURT.—That is not material. Proceed.

The WITNESS.—I have known of the magazine since 1897.

The COURT.—Proceed with your witness.

Q. When did you first see this volume to become familiar with it?

A. You mean the particular parts contained in that?

Q. Yes. A. About 1898,—1898.

The COURT.—Proceed.

Mr. LOFTUS.—I offer this volume in evidence. We will refer to certain parts contained in this volume, particularly page 294, Article entitled "Water Works at Dixon, Illinois." Article continuing over on page 295. Then on page 334, an article entitled, "Painting buildings by compressed Air." Then page 403, an article entitled "Compressed Air Dredgers for Gold Mining." Then page 496, "Pneumatic Painting Machinery"—for painting machines.

The CLERK.—That will be 172. [360]

Mr. WILLIAMS.—If the Court please, I would like to ask a preliminary question or two.

The COURT.—Very well, proceed.

(Questions by Mr. WILLIAMS.)

Q. Where did this book come from. Has it been in your possession for a long while?

A. Not mine. It has been in the company's possession. The Ingersoll-Rand Company.

(Testimony of H. L. Terwilliger.)

Q. I am not asking you that. When did it get into your hands, did you bring it here?

A. These particular books?

Q. Yes? A. They gave them to me.

Q. Who gave them to you? A. The attorneys.

Q. When? A. Within the last few days.

Q. Then all you know about this particular book is that a few days ago it was handed to you by these attorneys?

A. I know more—that I think it was probably two years ago that the San Francisco office of the company which I represent was asked to collect data and our publicity in New York, dug up this material and sent it out.

Q. Well, that is something that you do not personally know about, isn't it?

A. I know just what I stated.

Q. Well, that is all you know—that some publicity department is supposed to have dug it up and counsel handed it to you a few days ago and you come here and try to identify it? [361]

A. I have seen those magazines—

Q. (Interrupting.) You are answering my questions now, and you have answered them. I object on the ground that the volume is not sufficiently proven.

Mr. LOFTUS.—I asked the witness if he had carefully examined this volume.

The COURT.—Oh, yes, and he told you that it was simply collected recently and he saw it a few

(Testimony of H. L. Terwilliger.)

days ago. Objection sustained. Anything further with this witness.

Direct Examination (Continued).

(By Mr. LOFTUS.)

Q. Were you a reader of this compressed air magazine, and if so for what period of time?

A. I have been a constant reader of it since 1898.

Q. I ask you to refer to the articles that I have just mentioned in offering this volume, and state whether or not you recall reading those at or about the time of the date stated on each issue of that Compressed Air magazine contained in that volume.

A. Well, I began to read these in 1897—oh, we had these older numbers on file in the New York office of the Ingersoll-Sergeant Drill Company, and I have read them all.

Q. So that those articles that are marked there are articles which you read in the magazine known as "Compressed Air"?

A. They are "Compressed Air." [362]

Q. And were read by you at about what date?

A. I read these when I went with the Ingersoll-Sergeant Drill Company in 1898 and *1988*,—that is when I went to their New York office.

Mr. LOFTUS.—I submit that the witness has properly identified these as to date anterior to 1907 and I renew the offer.

The COURT.—Admitted.

(Whereupon volume called "Compressed Air" magazine at pages 294 and 295, 334, 403 and 496 of said volume admitted in evidence as Defendant's Exhibit No. 172.)

(Testimony of H. L. Terwilliger.)

The COURT.—Proceed. Anything further with this witness?

Q. Similarly with respect to this volume 8 of "Compressed Air" containing the various issues of that magazine between March, 1903, and February, 1904, I call your attention to the following articles, one on page 2329, "Sand Blast cleaning of Structural Steel," another on page 2529 entitled "Compressed Air Pump for Painting" and another on page 2566 entitled "Compressed Air in the elevation of Tailings," another on page 2629 entitled "Developing the Air Compressor," another on page 2723 entitled "Raising Water with Compressed Air," and I ask you to refer to those articles and state whether or not you saw those articles in the magazine between the dates mentioned, namely, March, 1903, and February, 1904, or otherwise.

Mr. WILLIAMS.—Objection. I think that the introduction of this material has reached a point where [363] any objection that can be made ought to be made. The pertinency—the thing that is of significance is the date of the publication of this stuff. This witness is not asked about that. The question does not tend to prove the facts in that regard, and I object on the ground that the evidence called for is immaterial and irrelevant. Now, here we have got hundreds and hundreds and hundreds of pages of this stuff and if there is any way to protect—to protect Court and counsel I am going to do it, and I make that rather technical objection.

(Testimony of H. L. Terwilliger.)

The COURT.—Sustained. Proceed.

(Whereupon volume of "Compressed Air" from March 1903, to February, 1904, was marked Defendant's Exhibit 174 and its admissibility denied.)

Q. I hand you a volume entitled "Compressed Air Information" by Saunders and I ask you if you are familiar with that and when you first saw a volume of that edition.

Mr. WILLIAMS.—I make the same objection.

The COURT.—Sustained.

Mr. LOFTUS.—This volume is pleaded, your Honor,—

The COURT.—The Court has ruled. Proceed. Take your exception and subside.

Mr. LOFTUS.—Exception. Nothing further.

Mr. WILLIAMS.—No cross-examination.

Mr. LOFTUS.—I will have these marked for the purpose of the record.

(Witness excused.)

Whereupon an adjournment was taken at five o'clock, Sept. 13, 1927, to ten o'clock A. M., September 14, 1927. [364]

September 14th, 1927, 10:00 o'clock A. M.

Court convened pursuant to adjournment.

All parties present.

Mr. WILLIAMS.—If the Court please, I should like to introduce an objection to the receipt in evidence of the papers referred to yesterday as exhibit 111, "Popular Handbook for Cement or Concrete Uses" on the ground that it is not set up in the defendant's bill of particulars. The same objection

to the receipt in evidence of two patents, one Smith, No. 122,497, and another one—I think it was given as Goodrich 333,887. I have not seen any memorandum of that in the answer or anywhere and I may not have the name right, but that is as I have got it.

Mr. TOWNSEND.—That is to show the state of the art.

The COURT.—What exhibits are there?

Mr. WILLIAMS.—These are exhibits offered yesterday by the defendant.

The COURT.—Oh, well, if you do not give me the number I certainly will not find them for you.

Mr. WILLIAMS.—One is Smith patent 112,497.

The COURT.—The number of the exhibit. I do not propose to search like a needle in a haystack and relieve you of the labor. What is the number of one of the exhbits?

Mr. WILLIAMS.—The number of one of the exhibits is 111 and the numbers of those patents—may I see if I can find them— [365]

The COURT.—(Interrupting.) We will not wait for you. You will have to find that some other time.

Mr. WILLIAMS.—If the Court please, the exhibits, of course have not been available to us until this moment.

The COURT.—You will have to find it some other time. I will not wait for you here to do the work in court. Call your next witness.

Mr. TOWNSEND—In regard to one of the exhibits, a page from Knights' Mechanical Dictionary on Pneumatic caisson work, I believe counsel has withdrawn their objection to that. This book has been in my possession for over twenty-five years, and if I aim to take the stand I will prove it.

The COURT.—Proceed with your case.

Mr. TOWNSEND.—Do you stipulate—do you withdraw your objection?

Mr. WILLIAMS.—If the Court please, I withdraw my objection yesterday as to this particular Knights' Dictionary.

Mr. TOWNSEND.—Very well, I did not understand you. I omitted to offer two exhibits in connection with the eastern depositions. One is a certified copy of the Canniff file-wrapper, No. 873,345 and the other is a certified copy of the McIllvrid patent 958,421. Those file-wrappers are offered to prove the date of the filing as constituting prior invention. In the absence of a stipulation that we asked in regard to unprinted copies of the patent, U. S. in form, and the acknowledgment of dates of filing as being correct, being denied us, we have offered certified copies of patents, we have offered certified copies of [366] the file-wrappers and in order to prove the date of the invention I might say that the patent was issued later than the McMichael patent, but applied for earlier and we have, according to law, furnished certified copies of them.

So I offer them now, and they will be marked their respective numbers 66, and 102 in connection with the New York depositions.

Mr. WILLIAMS.—I object to receipt in record of the Canniff file-wrapper upon the ground that it was not set up as a prior invention in the defendant's bill of particulars.

Mr. TOWNSEND.—I beg your pardon, you are incorrect. McIlvrid and Canniff have been pleaded from the start.

Mr. WILLIAMS.—We do not find them in the bill of particulars filed. Then, furthermore, I object to the receipt in evidence of all of these—I guess there are hundreds and hundreds of pages of file-wrappers most of which constitute correspondence back and forth between parties not parties to this record—that is, between these applicants and the Patent Office. If there is any materiality in any part of the papers it is confined purely to the applications as filed and the drawings as filed. So I object to the receipt in evidence of anything more than the original specifications and the accompanying drawings. I make my objection on that ground as to both of them.

As to the Canniff file-wrapper, I make the further [367] objection that it is not set up in the bill of particulars.

Mr. TOWNSEND.—I take issue with counsel. The Canniff patent is set out on page 3 and the McIlvrid patent is set out on the same page—yes, the same page. Both of those patents are there.

Mr. WILLIAMS.—Well, if the Court please, I have not objected to the receipt in evidence of their patents on that score because their patents are so set out. Counsel is not now offering these, as he states, to prove prior publication. We concede that they are published later and as patents they are too late. He brings them forward to show that they are prior inventions. There is a list of sixty or eighty prior inventions contained in the bill of particulars and neither of these is so included.

The COURT.—Have these been set out in any deposition heretofore taken?

Mr. TOWNSEND.—Yes. The prior invention of McIlvrid is testified to by Sohon in New York and appears in the New York depositions.

The COURT.—Does the patent show the date of application?

Mr. TOWNSEND.—The patent shows the date of application, but that is not self-proving, and by offering the file-wrappers they carry the invention back at least to as early as the date of the application, and the Supreme Court has recently stated in the Woodenville case that an invention, when the date of application is proven, relates back at least to that. [368]

The COURT.—Isn't that proven in the patent itself?

Mr. TOWNSEND.—Not in the patent itself—not under the law.

The COURT.—I think every patent has an application.

Mr. TOWNSEND.—It has, sir but it is not a proof of the filing on that date. So I had to take the precaution of using this somewhat circuitous method of proving that date.

The COURT.—The objection is that you have not pleaded—that you have not set out in your bill of particulars these things.

Mr. TOWNSEND.—The Supreme Court has said that when you can prove the date of the application, that shows the invention as of that date.

Mr. WILLIAMS—No question about that, but it is not pleaded. This is not my point. My point is that it is not pleaded.

Mr. TOWNSEND.—Well, it is pleaded—

Mr. WILLIAMS.—It is not specified there.

Mr. TOWNSEND.—If we plead it once we plead it and use it for all purposes.

The COURT.—Let me see the bill of particulars.

Mr. TOWNSEND—That is on page three, your Honor. The Canniff patent and the McIlvrid patent, both. I set out the filing date there, and this is to prove the filing date.

The COURT.—Well, in so far as to prove the Canniff filing date, it will be admitted.

Mr. WILLIAMS.—Now, if the Court please I wonder [369] if the Court and counsel would accept my stipulatian that the filing date of these patents is the date appearing upon the respective

(Testimony of T. J. McCormick.)

patents and thus obviate getting two or three hundred pages into this record.

The COURT.—You admit it?

Mr. WILLIAMS.—I do admit it. May we then have these papers excluded on that stipulation?

Mr. TOWNSEND.—It may be instructive in some other respect.

The COURT.—They will be excluded. We have too much in this case now.

Mr. TOWNSEND.—Your Honor, I ask that these be marked for identification, if I may.

The COURT.—They may be.

(Whereupon certified copy of Canniff file-wrapper 873,345 and certified copy of McIlvrid file-wrapper, 958,421 were marked Defendant's Exhibits 82 and 102 respectively, and their admission denied.) [370]

TESTIMONY OF T. J. McCORMICK, FOR DEFENDANT.

T. J. McCORMICK, defendant's witness.

I am 65 years of age; my name is T. J. McCormick; I live at 7073 Greenwood Ave., Brooklyn, New York, and I am a construction engineer—New York subway. I have had 30 years' experience and training along the lines of subway and tunnel work in both Boston and New York. I have had experience in the transportation of materials such as cement and concrete by compressed air. My first experience in the use of compressed air for such

(Testimony of T. J. McCormick.)

work was in 1898. The machine used at that time was a grout machine made of pipe. I have a drawing of such a machine. I made the original drawing from which was made the enlargement which you show me. This is a drawing which I made for introduction in evidence in a case of this same plaintiff against Great Western Power Company and in the case of this plaintiff against Stone & Webster. This enlargement represents a machine which I used in 1898. The machine consisted of a 12-inch pipe with a coupling on both ends and a screw plug on the bottom of the T with an air jet on one end and an outlet on the other—a discharge line. [371]

Q. Where was the grout put in?

A. In here (indicating).

Q. At the top? A. Yes, sir.

Q. And then did you close the receptacle?

A. We put the plug in and opened it at this valve and turned on this one and blowed it out.

Q. Did you close the receptacle? A. Yes, sir.

Q. After you put it in? A. Yes, sir.

Q. And then the concrete was removed from the receptacle out? A. Yes, sir.

Mr. WILLIAMS.—I object to the question as leading. I think the witness ought to tell.

The COURT.—Yes.

Mr. TOWNSEND.—I am trying to—

Mr. WILLIAMS.—(Interrupting.) I know you are trying, [372] but I am objecting.

(Testimony of T. J. McCormick.)

The COURT.—Let him explain it. It probably explains itself.

Q. And to remove the grout from the receptacle, what did you do?

A. Opened the discharge line and turned on the air in the air plug.

Q. And in which position on the picture is the air plug—at the right?

A. At the left The discharge plug is at the right.

Q. And from that discharge plug how was the grout conveyed to its point of delivery?

A. By compressed air.

Q. By compressed air and through what sort of a channel. A. A pipe.

Q. Through a pipe? A. Yes, sir.

Q. Was that device used commercially?

A. Yes, sir.

Q. And have you any original drawings or the original apparatus of that machine?

A. No, sir.

Q. What became of the machine itself?

A. They were all destroyed.

Q. When next did you use a machine of that type? A. In 1902 and 1903.

Q. On what work was that?

A. In the east Boston tunnel.

Q. And how did it operate there?

A. Just the same way. Grouting leaks in the tunnel. [373]

(Testimony of T. J. McCormick.)

Q. Was any considerable amount of grout used in the east Boston tunnel? A. Yes, sir.

Q. A large quantity or a small quantity?

A. A very large quantity.

Q. Over a brief period or a long period?

A. A long period.

Q. How long? A. Three years.

Q. Who was the engineer in charge of that work?

A. R. A. Shailer.

Q. Is that Mr. Shailer the same gentleman who gave his deposition at the time you did, in June, in New York in this case? A. Yes, sir.

Q. Where is Mr. Shailer now?

A. He is in Europe.

Q. Now, when next did you use a machine like that or similar to that?

A. In 1905—1906 on the Belmont Tunnel in New York.

Q. How was that machine constructed and operated?

A. The same as the previous one in East Boston—the same as in other operations.

Q. Did you know Mr. Canniff? A. Yes, sir.

Q. Whose name has been mentioned in connection with certain facts here? A. Yes, sir.

Q. Did you ever operate or work with him?

A. He was the Master Mechanic under me in the Belmont tunnel. [374]

Q. Do you know anything about a patent that Mr. Canniff took out? A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. Would you recognize a drawing of that device? A. Yes, sir.

Q. Of the Canniff device? A. Yes, sir.

Q. I show you an enlargement and ask you if you recognize that machine? A. Yes, sir.

Q. Did you ever see a machine of that sort in practical operation? A. Many of them.

Q. And when did you first see such a machine shown in the Canniff drawing or Canniff patent?

A. In 1905.

Q. Where was that?

A. In the Belmont tunnel.

Q. How did the operation of that machine compare with the machine shown in your original 1898 machine—with the operation shown in your original 1898 machine?

A. Practically the same.

Mr. TOWNSEND.—If your Honor please, I will offer the drawing of 1898, of the McCormick machine, as Defendant's Exhibit No. 175.

The COURT.—What machine is this?

Mr. TOWNSEND.—That is the original McCormick machine for shooting grout.

The COURT.—One that the witness testified to first? [375]

Mr. TOWNSEND.—Yes.

(Whereupon drawing of McCormick machine was admitted in evidence and marked Defendant's Exhibit 175.)

Q. Now, this Canniff machine, was that used extensively or otherwise? A. Very extensively.

(Testimony of T. J. McCormick.)

Q. And how long did you get the continued use of the Canniff machine?

A. From 1905—well, up to the present year,—1927.

Q. It has been in continuous use through all those years? A. Yes, sir.

Q. Now, have you ever used any other machine, prior to 1907 for depositing or placing grout or concrete by compressed air? A. Yes, sir.

Q. What machine was that?

A. We used two. We used the Greathead and the McIlvrid.

Q. What was the Greathead machine?

A. It was a cast iron, horizontal cylinder with an internal shaft, with paddles on it, agitating the grout and shooting it by compressed air.

Q. Where was the compressed air let in?

A. It was let in thru an opening on top of the cylinder and discharged through a pipe.

Q. And where was the discharge pipe?

A. On the bottom, the front end.

Q. The front end? A. Yes, sir.

Q. And how was the McIlvrid machine made and constructed [376] and operated?

A. It was practically the same thing, only it was a steel shell instead of a cast-iron shell and the intake and the outlet were the same.

Q. I show you a drawing and ask you if you know what that structure represents?

A. Yes, sir, that is the McIlvrid grout machine.

(Testimony of T. J. McCormick.)

Mr. TOWNSEND.—The witness refers to an enlargement of the McIlvrid patent, drawing, 958,421, application filed November 2, 1905.

Q. Now, did this McIlvrid machine have any other trade name? A. Not that I know of.

Q. Do you know the concern that manufactured it?

A. The Union Iron Works of Kansas City—of Hoboken.

Q. Are they manufacturing those to-day?

A. Yes, sir.

Q. Who handled them, do you remember, originally in 1905?

A. I am not positive whether it was the Ransome people or whether it was the Union Iron Works. I don't know which it was.

Mr. WILLIAMS.—Could you speak a little louder?

The WITNESS.—I am not positive whether it was the Ransome people or whether it was the Union Iron Works. I don't know which it was.

Q. Do you remember the Cockburn-Barrow machine? A. Yes, sir.

Q. Do you remember having a machine called the "Cockburn-Barrow machine"?

A. Yes, sir, we had a machine like that on the East Boston tunnel, very similar to this one, only a cast-iron [377] cylinder.

Q. How successfully were these machines shown in that drawing, 175, or the machines shown in the Canniff patents drawings or the machine shown in

(Testimony of T. J. McCormick.)

the McIlvrid patent drawings in the matter of operating? A. Very successfully.

Q. Have you ever seen a machine of a Canniff design employed for shooting grout? A. Yes, sir.

Q. What is that machine known as?

A. The Canniff-Ransome machine.

Q. What does the Ransome stand for?

A. I do not know what it stands for. They control it.

Q. Do you know the name of the company?

A. The Ransome Concrete Machinery Company.

Q. Is that the company with which the gentleman is identified who testified yesterday? A. Yes, sir.

Q. Now, how did that Ransome Canniff concrete gun compare with or differ from, if it did, the Canniff grout gun shown in the patent?

A. Practically the same, only on a larger scale. There was a larger discharge and a larger cylinder.

Q. In your opinion as an engineer, is there any difference in operation between the conveying of concrete and the conveying of grout by compressed air? A. Practically none.

Q. I show you a drawing or an enlargement of a drawing and ask if you recognize that apparatus? What is it supposed to represent? [378]

A. It is a multiple Canniff machine.

Q. A what?

A. A multiple Canniff machine. It goes through on one line.

Q. Does that represent a type of Canniff machine that you are familiar with? A. Yes, sir.

(Testimony of T. J. McCormick.)

Mr. TOWNSEND.—I ask that this be marked for identification Exhibit 176. Your Honor, do you care to have these other enlargements marked or just use them for illustrative purposes, since the patents themselves are in evidence. I will offer them if I may—I will have the Canniff exhibit marked 177, of the defendant, and the McIlvrid patent enlargement, 178.

(Whereupon drawings representing type of Canniff machine was marked Defendant's Exhibit 176 for Identification; another drawing of a type of Canniff machine was marked Defendant's Exhibit 177 for Identification, and McIlvrid patent enlargement was marked for Identification Defendant's Exhibit No. 178.)

Q. Do you know where there is a machine like the Canniff machine shown on Defendant's Exhibit 177? A. Yes, sir.

Q. Where is it?

A. Downstairs in this building.

Q. Where did that machine come from?

A. From New York.

Q. Did you have anything to do with getting that machine in New York? A. Yes, sir.

Q. Is that the machine that was introduced in evidence and [379] shipped to San Francisco in connection with the previous depositions we have referred to? A. Yes, sir.

Q. And where did you get that machine from?

A. From Patrick McGovern & Company.

Q. Where? A. Long Island City.

(Testimony of T. J. McCormick.)

Q. Had that machine been in use? A. Yes, sir.

Q. Did you use that particular machine?

A. Yes, sir.

Q. Does it show evidence of use now?

A. Yes, sir.

Mr. TOWNSEND.—Your Honor, that machine is in the basement and we will offer it in evidence as Defendant's Exhibit 179 and we ask—we invite the Court and counsel later to inspect it.

The COURT.—There is no objection to that.

(Whereupon Canniff machine was admitted in evidence and marked Defendant's Exhibit No. 179.)

The COURT.—What times does the Canniff machine date from—what is the name of it?

A. The Canniff machine—C-a-n-n-i-f-f.

Mr. TOWNSEND.—It goes back to—

The COURT.—(Interrupting.) It does not show on here where it dates from.

Mr. TOWNSEND.—That is a patent drawing, and a patent drawing—

The COURT.—(Interrupting.) I am not asking you what that is—I am asking you when that patent goes [380] back to?

Q. When was that particular machine made, do you know? A. First about 1908 or 1909.

Q. Were you able to find a Canniff machine in existence any earlier than that? A. No, sir.

Q. Did you make or did you not make diligent search? A. I did.

Q. And is there in existence to-day a Canniff machine earlier than this one?

(Testimony of T. J. McCormick.)

A. I presume there are a lot of them, but I could not find any.

The COURT.—Well, how far do they date back? That is the question.

A. My first association was in 1905.

The COURT.—Of this one, the same as this one?

A. Yes, sir.

The COURT.—Proceed. You may cross-examine.

Mr. WILLIAMS.—If the Court please, I should like to see this exhibit in the basement before cross-examining the witness on his testimony regarding it.

The COURT.—Cross-examine him now. If you want to call him again you may. They say the machine is the same as this drawing.

Mr. TOWNSEND.—I would state further, your Honor, that that machine was in evidence in New York and Mr. McCormick was there and he was rigidly cross-examined by Mr. Cox on behalf of the plaintiff. Of course, we have no objection. [381]

Cross-examination.

(By Mr. WILLIAMS.)

Q. You say that this grout about which you have been testifying in connection with these machines was used for grouting leaks in tunnels?

A. Yes, sir.

Q. Now, just what does that mean? What caused the leaks?

A. In the construction of the work, some of the steel rings were spread. Each plate has a grout

(Testimony of T. J. McCormick.)

ring through,—to surround the outside of that shell with a grout ring,—to stop leaks on the outside of the tunnel.

Q. How large is the space that is filled by this grout? Are they cracks or little openings?

A. Well, the only evidence of cracks is on the inside. Nobody can tell what is on the outside.

Q. Well, whatever cracks or little openings there may be are filled by this grout? A. Yes, sir.

Q. And that is what the thing was used for?

A. Yes, sir.

Q. Now, this grout that was used for that purpose, that was a mixture, was it, of water and sand and lime, or water and sand and Portland cement?

A. Well, it was all sorts of mixtures—cement and water, that is, neat cement and cement, sand and water.

Q. Well, those materials—for example, did you take neat cement, that is, cement and water only? That is plastic material, a little thicker than paint, isn't it? It flows—it will flow—

A. (Interrupting.) I do not know much about the consistency [382] of paint so that it will flow freely.

Q. About the consistency of paint?

A. Yes, sir.

Q. So that it will flow freely, you say?

A. Yes, sir.

Q. And the same applied to all these mixtures of grout, I take it? A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. Now, when these grouting machines that you have described—in all these grouting machines that you have described there were valves such as are best illustrated perhaps in this McIlvrid patent or cocks, were there not? A. Yes, sir.

Q. Those are all ordinary water cocks, aren't they?

A. Those are the outlet cocks. That is, the outlet or discharge line.

Q. I am not talking about whether water or something else flowed through it, but I mean the construction in there. It was just a tapered flood cock as plumbers use in water pipes?

A. Not plumbers; steam fitters.

Q. Well, just like steam fitters would use.

A. Yes, sir.

Q. That had a tapered flood with a little rectangular opening through it, did it? A. Yes, sir.

Q. And this paint-like grout flowed through the rectangular hole in that plug valve, did it?

A. Yes, sir.

Q. Now, as I understand the operation of this McIlvrid [383] machine, for example, this grout of approximately the consistency of paint was stirred up by these paddles within this chamber?

A. Yes, sir.

Q. And mixed there? A. Yes, sir.

Q. Where was the cement or cement and sand put into this machine? A. At the top door.

Q. That was opened and those materials put in?

A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. And was water then put into this box also?

A. Yes, sir, right through the top.

Q. Right through the top? A. Yes, sir.

Q. And then the paddles churned up—churned it up into this paint-like material? A. Yes, sir.

Q. Then, as I understand you, this valve at 15 was opened so that compressed air got into the box on top of this paint-like material?

A. The door was shut first and then the air turned on.

Q. And when this air pressure was applied it forced this paint-like grout through the bottom of the box and out through this pipe and this tapered plug cock and through a hose, was it?

A. A hose or pipe.

Q. A rubber hose? A. A discharge line.

Q. Forming the discharge line? [384]

A. Yes, sir.

Q. And it was carried through that pipe or hose to these cracks or leaks in the concrete or steel or brick tunnel? A. Yes, sir.

Q. And applied to the cracks to seal them up?

A. Yes, sir.

Q. That was somewhat comparable to what a mason does in brickwork with his trowel when he plasters up or points up the spaces between bricks —that is fills cracks in that way?

A. Oh, no, it is forced right into the fissure with pressure and not plastered on the face.

Q. Forced into the fissure? A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. By whatever pressure was available at the end of this hose? A. Yes, sir.

Q. Now, that, in a general way, describes also the operations of these other grouting machines and the material used in them, does it?

A. Absolutely the same.

Q. Now, this double-barrelled Canniff drawing that was—that is marked here Defendant's Exhibit 176, is that a drawing which you made yourself?

A. No, sir.

Q. Or had made? A. No, sir.

Mr. TOWNSEND.—That is for identification, your Honor. It has not been proven yet. [385]

Mr. WILLIAMS.—Well, I am examining the witness about it.

Q. Do you know where it came from?

A. No, sir.

Q. You say you saw apparatus such as is shown in this drawing, defendant's exhibit No. 177 for identification? A. Yes, sir.

Q. And that drawing shows the sizes of these pipes, does it—two-inch pipe? A. Yes, sir.

Q. Two-inch pipe there? A. Yes, sir.

Q. Half-inch bleeder here?

A. Yes, sir. The difference between that machine and the other one is that this is a high pressure machine used by the board of water supply on the waterworks in New York.

Q. These valves are shown on this drawing are ordinary gate valves such as are used by plumbers or steam-fitters?

(Testimony of T. J. McCormick.)

A. They are very high pressure valves.

Q. Well, they are gate valves?

A. Yes, sir, to keep open the gates.

Q. And this drawing, I presume, is intended to indicate here—

A. (Interrupting.) Is the outside.

Q. I mean at this place marked "One" in the air inlet, that is where the compressed air came in on top of the grout within the box here, is that right?

A. Yes, sir. [386]

Q. Now, the operation of this double-barrel dual Canniff device, that was just like the single one, except there were two, isn't that right?

A. Well, you will notice the difference in the thickness of that shell. This shell is ¾ of an inch thick and will stand three or four or five hundred pounds pressure and this one is good for fifty or sixty. At any rate, except for the fact that higher air pressure was used, and the machine was made stronger in order to accommodate that higher air pressure, and except for the fact that there were two barrels for the releasing, instead of one, the operation was the same as you have described for the McIlvrid machine?

A. The Canniff machine. They are just the same.

Q. Well, they are just the same, are they?

A. Yes, sir.

Q. And the material used for this Canniff arrangement was such grout as you have described?

A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. Now, you said that some of these grouting machines—I think you named the McIlvrid, that is still in use to-day, didn't you say? A. Yes, sir.

Q. And the Canniff? A. Yes, sir.

Q. They are used for grouting work such as you have described? A. Yes, sir.

Q. To-day? A. Yes, sir. [387]

Q. Just as they were when you first knew them?

A. Yes, sir.

Q. 1902 or 1905? A. Yes, sir.

Q. I guess 1898 you spoke of it, didn't you?

A. Well, in 1905, the Canniff.

Q. Well, at any rate, from the time you first learned of them down to the present date?

A. Yes, sir.

Q. They have always been used for this grouting in the manner that you have described?

A. Yes, sir.

Q. You handled substantially that same grout material? A. Yes, sir.

Mr. WILLIAMS.—That is all.

Redirect Examination.

(By Mr. TOWNSEND.)

Q. Mr. McCormick, from your experience in handling the work of concrete, and so forth, is this machine, illustrated in Defendant's Exhibit 176 for Identification, applicable to the transportation of concrete? A. Yes, sir.

Q. By means of compressed air? A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. In the manner that you have already described? A. Yes, sir. [388]

Mr. WILLIAMS.—If the Court please, my associate has determined the exhibit numbers of these two patents to which I made objection. No. 140 is the Smith patent, 122,497; and No. 142 is the Goodrich patent, No. 333,887, if I have the date and the number and the name right. To both of these I object upon the ground that they are not set up in the bill of particulars.

Mr. TOWNSEND.—Your Honor, they are not properly in the bill of particulars, because they are there to show the state of the art. The Smith patent is a companion patent to the Smith 1872 concrete patent, and it has a cross-reference to the patent set up. So it is a part and parcel of the Smith patent.

Mr. WILLIAMS.—If the Court please, I think it was clearly—

The COURT.—(Interrupting.) The bill of particulars was intended to show what patents were intended to be introduced here. Objection sustained for any purpose.

Mr. TOWNSEND.—Exception. [389]

TESTIMONY OF ROY C. HACKLEY, FOR DEFENDANT.

ROY C. HACKLEY, defendant's witness.

I am the Roy C. Hackley who has already been called and sworn in this case. I have trained as an

(Testimony of Roy C. Hackley.)

engineer and have followed the construction business for about 18 or 19 years as superintendent, engineer and contractor. I studied engineering for four years at California and one year at Harvard University. [390]

Q. Reference has been made to defendant's apparatus here and identified in connection with R. C. Hackley patent, March 1, 1927, No. 1,619,297. I show you the enlargement of the same and ask you if you are the same R. C. Hackley? A. I am.

Mr. TOWNSEND.—At this time I will offer this drawing as Defendant's Exhibit No. 180.

(Whereupon drawing of Hackley patent No. 1,619,297 was admitted in evidence as Defendant's Exhibit No. 180.)

Q. Now, what were the circumstances, Mr. Hackley, in connection with getting up that gun?

A. That was gotten up at the time that the Skagit work was being prosecuted. It was put in when the gun we started to use was condemned by the city engineers—that is, the work being done with it was condemned.

Q. That gun which was condemned, I believe, has already been described and identified as a so-called McMichael gun? A. Yes, sir.

Q. Did that so-called McMichael gun—

Mr. WILLIAMS.—I object to that last question as leading.

Mr. TOWNSEND.—I am just summarizing the testimony.

The COURT.—Oh, yes, overruled. Proceed.

(Testimony of Roy C. Hackley.)

Q. Now, that McMichael gun used a U-bend corresponding to or similar to or like the bend No. 24 in the enlargement of the McMichael patent drawing in suit?

Mr. WILLIAMS.—If the Court please, I object to that statement as assuming a statement not in conformity with the evidence. The evidence was that that machine first [391] used at the Skagit river project was a machine made by R. C. Storrie and Company, or for them, and not by the plaintiff.

Mr. TOWNSEND.—This is preliminary.

Mr. WILLIAMS.—Counsel says, "In the McMichael machine they are used." It never was "McMichael" with the sanction or authority—

The COURT.—(Interrupting.) The Court so understands. It is merely a name that is given to it. Proceed. Let him answer the question. Overruled.

A. That gun had no bend or trap.

Q. Have you ever seen a gun of the type or character or design of this McMichael drawing that had a U-bend? A. No, I have not.

Q. What, from your knowledge as an engineer and your experience in handling concrete materials would be the effect of the interposition of the U-bend in the outlet of a concrete gun?

A. It would form a trap and would prevent the concrete from leaving the gun.

Q. And the result would be what? A. A plug.

Q. And when you get a plug, what happens?

(Testimony of Roy C. Hackley.)

A. There is no movement of the concrete or discharge.

Q. What do you do then?

A. If it is a serious plug you have either to disconnect the pipe or take the concrete out of the pipe. You cannot do it by hammering on the pipe.

Q. How did the concrete come out of that gun that was condemned—that so-called McMichael gun? Did it come out in a continuous flow or by a so-called flood action, such as this expert, plaintiff's expert Mr. Ray has [392] described as in his opinion exists.

A. Came out in a continuous stream.

Q. What would be the effect in your experience of a so-called plug action or the cause of a so-called plug action?

A. If a slug does form in the pipe it will form a plug and stop the action entirely. In order to have the concrete continue to go through in the pipe, the air has got to go through with it. As soon as the air is stopped the flow stops entirely.

Q. Now, in a machine according to your patent shown on Exhibit 180 before you, or the drawings of your patent exhibit 180, and the machine used on the Skagit job, claimed here to infringe, how did the material issue from the discharge pipe?

A. In a continuous stream, mixed with the air.

Q. Was that projected impulsively and violently, or slowly?

(Testimony of Roy C. Hackley.)

A. It could be controlled by the operation of the valves. The speed of the discharge could be controlled by the operation of the valves directly.

Q. What is the practice?

A. That is the practice.

Q. To do what?

A. To control the discharge and make the discharge as slow as possible.

Q. To control the discharge and make the discharge as slow as possible? A. Yes, sir.

Q. What is the purpose of that?

A. To prevent separation of the concrete and to prevent also—make the wear on the pipe less.

Q. When the concrete leaves the gun and blows out of it in [393] your machine, what happens to the concrete itself, does it stick in a mass or does it flow by gravity down the side?

A. It flows by gravity.

Q. That is wet concrete or dry concrete?

A. Wet concrete.

Q. Do you know what dry concrete is?

A. Dry concrete is concrete that requires tapping —tamping or ramming to get it into place.

Q. Can dry concrete, as known to engineers, be used in a gun of this sort?

A. No, it cannot.

Q. Can it be used in a gun of McMichael character? A. No, it cannot.

Q. Do you know when wet concrete came into effect?

(Testimony of Roy C. Hackley.)

A. There was a transition from dry to wet concrete around 1907 or 1906—1906 or 1907. They were still using some dry concrete at that time.

Q. Were there advocates for one school or class?

A. Yes. There was a difference of opinion whether the concrete should be dry and require ramming in order to bring water to the surface, or whether wet concrete would be better.

Q. Have you ever used your gun for shooting anything besides concrete?

A. I have. I have used it for shooting grout.

Q. And when you used it for shooting grout, what did you do with your gun?

A. Simply reduced the size of the discharge to satisfy the size of the grout,—to suit the size of the grout pipe that we were using. [394]

Q. How was the air let into your gun when you were using grout?

A. In the same manner as when we were using concrete.

Q. When you were shooting grout through this reducer, how did the grout issue from the end of the gun? A. In a steady stream.

Q. Could you identify any photographs that I show you illustrative of any part of your testimony?

A. Yes. That is one of my concrete guns. (Indicating.)

Q. Anything else in connection with it appearing there?

(Testimony of Roy C. Hackley.)

A. This one has a reducing flange on it, using it for the purpose of shooting grout.

Mr. TOWNSEND.—I will ask that this one that has been last referred to be marked for identification Defendant's Exhibit 181 and the other one be marked for identification Defendant's Exhibit 182.

Q. Are you familiar with the Canniff gun that we have been talking about here in evidence?

A. I am.

Q. Have you ever used one?

A. I have used the same type—the exact copy of it.

Q. Have you ever used a machine such as is illustrated here, Defendant's Exhibit 176?

A. I have—a single machine.

Q. In a single machine was the type as far as the one machine, at the left we will say, is concerned, alike or unlike drawing 176 for identification?

A. It is practically the same as that.

Q. And that—did that successfully blow the material from the gun by means of compressed air?

A. It did. [395]

Q. In your opinion is the machine shown here on Defendant's Exhibit 176 adapted to blowing concrete? A. Yes, that will blow concrete.

Q. Have you ever blown concrete with a gun similar to this? A. I have.

Q. Have you one of your guns in operation anywhere, or had one anywhere recently in operation—

(Testimony of Roy C. Hackley.)

strike that out, please. Have you had one of your guns in operation at the so-called Maloneys' project in California? A. Yes, sir, I have.

Q. Where is Maloneys' located?

A. It is on the Stanislaus River.

Q. How did that gun compare with the Skagit gun?

A. It is the same as the Skagit gun.

Q. And how did the material that you shot through it compare with the material used on the Skagit project?

A. The concrete was practically the same. Same consistency.

Q. Do I understand it was the same formula—do I understand it was the same or a different formula of consistency?

A. The consistency was the same. The mix was a trifle different.

Q. How did the concrete come out of that gun?

A. It comes out in a continuous stream.

Q. You said that you had shot concrete through a machine similar to the Canniff machine?

A. Yes, sir.

Q. I show you a photograph and ask you if you know what that is?

A. That is the grout machine built by myself—twelve [396] cubic feet machine.

Q. And where is that machine located? [397]

A. In San Francisco.

Q. And what materials have you shot through that? A. Shot grout or concrete.

(Testimony of Roy C. Hackley.)

Q. And was a demonstration made of the use of that in shooting concrete recently?

A. There was, about a week ago.

Q. And is that the time that we held a demonstration to which we had invited the plaintiff and its attorneys to attend?

A. Yes. I understood that you invited the plaintiff.

Q. Now, at the same time did you demonstrate the shooting of any other material through another type of gun? A. I did.

Q. I will show you some photographs and ask if you recognize those. First, I will offer this photograph, I will just offer all those photographs in just a minute.

A. Yes, I recognize these photographs. I had them taken.

Q. Under whose direction were these photographs taken?

A. They were taken under my direction.

Q. Do they truly and correctly represent what they purport to show? A. Yes, they do.

Mr. TOWNSEND.—I offer this first Canniff type gun as Defendant's Exhibit 183 and I offer the other photographs identified by the witness, respectively as Exhibits 184 and 185.

(Whereupon photographs of Canniff machine was admitted in evidence as Defendant's Exhibit No. 183 and two other photographs were admitted in evidence as Defendant's Exhibits 184 and 185 respectively.)

(Testimony of Roy C. Hackley.)

Q. Now, take photograph exhibits 184 and 185 and tell us what they represent, and tell us what was done at the time that those tests were performed publicly? [398]

A. They represent a machine built for the purpose of shooting concrete through a pipe. The discharge pipe is a four-inch pipe with a four-inch valve on it directly under this container. On top there is a two-inch and a quarter air connection. The air was let into the chamber under a 100-pound pressure. On the side was an opening for filling concrete or materials to be discharged from the pipe. We first filled that container with water and turned on the air and opened the valve at the bottom after plugging the inlets—the charging opened the valve at the bottom and the water was discharged through the pipe.

The COURT.—What is the object of this?

Mr. TOWNSEND.—This is a demonstration of the Smith patent of 1872 showing it to be a practical machine. Very similar to the Siemens' situation in the Anaconda case.

The COURT.—Proceed.

A. I might say that the end of that discharge pipe was about thirty feet from the machine and at an elevation of about twenty feet above it. After shooting the water out, we filled the container with concrete and shot that out in the same manner. We then used concrete—mixed concrete with rock up to an inch and a half in size of two different consistencies or two different mixtures and

(Testimony of Roy C. Hackley.)

that was discharged in a continuous stream in the same way.

Q. You say that the concrete was in two different mixtures. Will you please tell us what those mixtures were?

A. The first mixture by weight—one of cement and one of sand and three of rock. The second mixture, one of cement, two and a quarter of sand and about four and three-quarters of rock. [399]

Q. By volume of weight?

A. By volume,the second one.

Q. Now, will you just mark, please the receptacle with the letter "A" and the discharge pipe with the letter "B" on both of those?

(Witness marks same.)

Q. Who in the courtroom was present at the time that that demonstration was made?

A. Mr. Loftus, Mr. Peterson, Mr. Wilkins, yourself and myself.

Q. Is that machine here in town?

A. It is. It is in the basement of this building.

Q. What does that machine weigh?

A. About 500 pounds.

Mr. TOWNSEND.—We will offer that machine in evidence, your Honor, as Defendant's Exhibit 186.

(Whereupon Smith's machine was admitted in evidence as Defendant's Exhibit No. 186.)

Mr. TOWNSEND.—We will offer further proof on its manufacture, design, etc.

(Testimony of Roy C. Hackley.)

Q. You said that the pipe of that demonstration machine represented in the photographs 184 and 185, extended up about twenty feet in the air?

A. Yes, sir.

Q. Why was that?

A. Because that is the usual working condition that any concrete gun works in.

Q. How near do the working conditions in other respects correspond for the demonstration to present every-day working conditions? [400]

A. Just practically the same as everyday working conditions as near as we could get them.

Q. In your opinion as an engineer, did they shoot the concrete successfully?

A. Yes, they shot the concrete successfully.

The COURT.—Do not let the examination drag.

Mr. TOWNSEND.—No, your Honor.

Q. You heard the plaintiff's expert, Mr. Ray, speak about listening to material going through the pipe and giving it as his opinion that there were slugs passing and that he also put gauges upon the pipe. State what you know about the use of gauges upon a discharge pipe for measuring the flow or the consistency, etc., of material like concrete?

A. If the statement was made that the gauges were put on the discharge pipe, they would not act. They would fill with concrete right away.

Mr. TOWNSEND.—Q. We offer that Hackley certificate—the certificate of the original Hackley patent, referred to as Exhibit 187.

(Testimony of Roy C. Hackley.)

(Whereupon original Hackley patent was exhibited in evidence as Defendant's Exhibit No. 187.)

Mr. TOWNSEND.—That is all.

Cross-examination.

(By Mr. WILLIAMS.)

Q. Now, these gentlemen that you named have witnessed this so-called public demonstration a week ago, none of those gentlemen were connected with the plaintiff's side of this case, were they? [401]

A. No.

Q. You know them all and you know what their interests are? A. Yes, sir.

A. They are all interested with you on the defendant's side?

A. They are not interested with me except as witnesses.

Q. Now, in this demonstration of the Smith's apparatus, as illustrated in these photographs, defendants exhibits 184 and 185, you say that that apparatus worked satisfactorily in shooting or discharging concrete. Was all of the concrete discharged from the chamber of that apparatus with each mix and blow?

A. Not all of it, no. Very seldom is.

Q. Some are left? A. Yes.

Q. How much was left?

A. Oh, possibly ten per cent of it or possibly fifteen per cent.

Q. Why was that ten or fifteen per cent left?

(Testimony of Roy C. Hackley.)

A. Because it was flat bottom.

Q. On account of the flat bottom of the chamber?

A. Yes, sir.

Q. Where does the discharge pipe leave, at the center of the bottom or near one side of the bottom?

A. Center of the bottom.

Q. So that there was a square bottom chamber, was there, such as is shown in this Smith patent, 122,498, and a discharge pipe leaving the center about as there illustrated? [402]

A. Yes, that is correct.

Q. Now, was the concrete which you say you discharged from that tank a week ago, was that such material as is described in this Smith patent where it says here, "The composition is sufficiently liquid to settle to a perfectly level surface." Was it of that character?

A. Yes, it had settled pretty close to a level surface. Some of it would.

Q. Well, this says "To a perfectly level surface."

A. Well, I don't know whether you would call it perfectly level or not.

Q. Well, I am asking you, of course, about the material that you used in this machine. Was that of this character which would settle to a perfectly level surface?

A. No, that would not settle to a perfectly level surface without agitation.

Q. It would not? A. No.

(Testimony of Roy C. Hackley.)

Q. And it was for that reason that some of this material was left on the flat floor of this tank?

A. Yes.

Q. And was not discharged, was it?

A. Yes, sir.

Q. Now, if you had used enough water in that composition so that it would have the characteristics described by Smith here—that is, being a composition sufficiently liquid to settle to a perfectly level surface, then none of that material would have been left in the bottom of that chamber?

A. Yes, sir, some of it would have been left. [403]

Q. It would have? A. Yes.

Q. Why would it have been left?

A. Because the liquid part would be blown off and leave some of the dry portions in the corners.

Q. That is, a little sediment would settle?

A. If there was rock there some of the rock would stay in the corners.

Q. But in the main, if the material was of a liquid consistency described in this Smith patent, then the bulk of it would go out except for some little settling?

A. It would gradually collect in there.

Q. Collect where?

A. Collect in the corners.

Q. Then do you claim the material which you did discharge from this flat bottom Smith tank—I suppose that had merely air pressure on top of it?

(Testimony of Roy C. Hackley.)

A. Yes, sir.

Q. There was no second jet which by its velocity broke up or compacted the concrete material and carried it along through the duct either in slugs or otherwise, was there, in your demonstration of this Smith apparatus? A. No, there was not.

Q. You relied merely on the air pressure supplied to the top of that tank to force the paint-like concrete out of the bottom, did you?

A. To force the concrete out of the bottom, yes.

Q. Now, of course, in the Hackley machines which you designed and which you put in use on this Skagit work and at Maloneys, did you say— [404]

A. (Interrupting.) Yes, sir.

Q. (Continuing.) —I suppose you have done that elsewhere, also? A. Yes, sir.

Q. You, of course, are not satisfied with and you do not rely upon air pressure on the top of the concrete only as in this Smith box or tank, do you?

A. No, sir.

Q. You have second jets which blows a stream of air into the chamber just in advance of the exhaust duct and directed toward that duct, do you not? A. Yes, sir.

Q. Now, of course, there is a reason why you do that, isn't there? A. Yes, sir.

Q. One of the reasons is that you get a different and a better action, don't you?

A. You start the—

Q. (Interrupting.) Well, I am asking you.

(Testimony of Roy C. Hackley.)

This is cross-examination. Answer either yes or no. A. Yes.

Q. Now, by this demonstration—I suppose this was intended to be a demonstration, was it, of the Smith patent. Did you get up this apparatus?

A. I don't know whether this was the Smith patent or not.

Q. Did you make up this apparatus?

A. I did not make it up. It was delivered to me and I set it up.

Q. Who delivered it to you?

A. Mr. Muir. [405]

Q. Who? A. The R. C. Storrie man.

Q. Now, let me see. Now, in this Smith patent there is shown, is there not, a valve in the discharge pipe? A. Yes, sir.

Q. Was there such a valve or any valve in the discharge pipe of this apparatus shown in your exhibit or in exhibits 184 and 185? A. There is.

Q. Can you point to them?

A. This valve right there (indicating). A big operating gauge valve—a slide valve. It is right in the discharge pipe there. (Indicating.)

Q. What shows here is merely the handle?

A. It shows the handle. I don't know whether it shows any better than that in that one or not.

Q. Now, you have testified that in a machine such as that illustrated in the McMichael patent, that if there was a U-bend in the discharge pipe or at the bottom of the chamber, that in your opinion the

(Testimony of Roy C. Hackley.)

concrete would pack in that bend and choke up the discharge pipe. That was your opinion, was it, if I rightly understood you?

A. That is my opinion.

Q. Now, supposing material, so-called concrete which was so thin a fluid, as to have the characteristics of settling to a perfectly level surface, as described in this Smith patent were to go into the chamber of the McMichael patent and the air pressure were turned on to the top of that chamber and on to the top only, would that material choke in that U-bend or would that flow through [406] like water? A. The water would blow out first.

Q. Would that material go through?

A. Some of the gravel might go through and it might stay in.

Q. If it would go out of this tank, shown in the photographs Defendant's Exhibits 184 and 185,—if it were sufficiently liquid and fluid to flow out of that tank, why wouldn't it flow through that U-bend of the McMichael apparatus?

A. I do not say that it would flow out of that tank —the concrete that was put in there.

Q. Didn't it flow out?

A. No, it didn't. It dropped out when we opened the valve. Yes, that started up the discharge.

Q. What do you mean by "dropped"; didn't it flow?

A. When the trap was opened it started the discharge.

(Testimony of Roy C. Hackley.)

Q. Didn't it flow?

A. It acted the same as a jet of air.

Q. What did? A. The opening of the valve.

Q. Do you mean to say that the opening of the valve acted the same as a jet of air?

A. Yes, underneath it. It started through the discharge pipe.

Q. That is, the gravity that caused that to drop down out of that tank, that was comparable to the action of an air jet?

A. It broke the bond right at the opening.

Q. What do you mean by "bond"?

A. It broke the surfacing of the concrete right at the discharge [407] opening.

Q. It broke some of the air and it dropped some through there?

A. It started to drop through.

Q. Didn't it flow through?

A. You can call it dropping or flowing through there.

Q. Which was it? A. Both.

Q. You said that that concrete came out like a stream of water—in a solid stream?

A. I said it came out in a solid stream mixed with air.

Q. Isn't it a fact that you testified that you put the water in the tank and put the air pressure on that that the water flowed out in a solid stream?

A. Mixed with air.

Q. How did the air get in?

(Testimony of Roy C. Hackley.)

A. It mixed right through with it.

Q. Where did it get in?

A. In the passage through the pipe.

Q. Now, let me see if we understand what we are talking about?

The COURT.—Do not spend so much time wrangling with the witness.

Q. If I understand you, you had a tank here and how much water did you put in there?

A. About ⅔ full.

Q. You filled that two-thirds full of water?

A. Yes, sir.

The COURT.—Do not repeat so much. He said so and let it go at that. [408]

Q. Then there was a discharge pipe which led from the bottom of that tank horizontally some distance, I presume, and then up about twenty feet?

A. Yes, that is correct.

Q. Then you applied air under pressure to the top of that tank there by an inch and a quarter pipe? A. That is correct.

Q. Didn't that air pressure acting on the top of that water in that tank press the water downwardly and into the discharge pipe?

A. No, not with the valve closed.

Q. Not with the valve closed? A. No, sir.

Q. Did you open the valve after the air pressure was turned on?

A. At approximately the same time.

Q. At approximately the same time?

(Testimony of Roy C. Hackley.)

A. Yes, sir.

Q. Now, did the pressure acting on the surface of that water force that water down through that pipe in a solid stream, filling the discharge pipe?

A. It mixed with the water as it went out.

Q. What made it mix?

A. The pressure of the air. The air travelled faster than the water.

Q. And that water coming out in the way it did, in the way you now describe, is what you mean when you say that the water came out in a solid stream, is it?

A. In a solid stream mixed with the air.

Q. And that is the way that the grout came out, is it? [409]

A. The grout comes out that way unless some of the valves are opened on the top of the grout and forces it out in a solid stream.

Q. You operate in the same way with the water and the grout as you did with what you called the concrete, didn't you? A. Yes, sir.

Q. And the water came out in a way—

The COURT.—(Interrupting.) Do not repeat. He has gone over that.

Q. The concrete came out in the same way as the water did? A. Yes, sir.

Q. And in the same way as the grout?

A. Yes, sir.

Q. And you heard Mr. McCormick's testimony here, did you? A. Yes, sir.

(Testimony of Roy C. Hackley.)

Q. And the grout that you used in that apparatus of exhibits 184 and 185 is the grout as he described it, is it? A. Yes, approximately the same.

The COURT.—Anything further? If not, redirect.

Mr. WILLIAMS.—I have not finished my cross-examination.

The COURT.—Conclude it. If you must look at the paper and you do not have it in your head, I am sure it is not very important.

Q. You said in connection with some demonstration of the Hackley grouter in California a week ago that plaintiff or plaintiff's counsel were invited to go, did you?

A. Yes, I do not know whether they were invited or not. I was told that they were invited.

Q. And you assented to the fact here in your testimony that [410] they were so invited, didn't you?

A. I understood from my attorneys that they were invited.

Q. Who told you? A. Mr. Townsend.

Q. Were any such attorneys there whom you recognized or were told were the attorneys for the plaintiff? A. None that I know of.

Q. And you don't know except as you were told that any such representative was—

A. (Interrupting.) There was no one there that I did not recognize.

Q. I am asking you another question now.

(Testimony of Roy C. Hackley.)

The COURT.—Well, he has told you that he only knows that by hearsay. That is sufficient. If you want to move to strike, move to strike without wrangling too much.

Mr. WILLIAMS.—I do move to strike.

The COURT.—It is stricken. Proceed now. Redirect if you have any.

Mr. TOWNSEND.—Just one question.

Redirect Examination.

(By Mr. TOWNSEND.)

Q. When was that demonstration held? The hour at which it was held?

A. At four o'clock on the afternoon of September 7th, I believe. [411]

TESTIMONY OF ROY WILKINS, FOR DEFENDANT.

The next witness for the defendant was ROY WILKINS, age 39, who is an electrical engineer specializing in research and test work and who has been engaged in engineering research work since 1910. He was familiar with the apparatus in controversy and knew the Hackley gun, with the operation of which he had made tests.

The COURT.—Interrupting, asked, "Is the Hackley gun the gun that the defendant claims to be using?" to which Mr. Townsend stated, "Yes, sir."

The witness stated that being asked to make tests to find out what the nature of the flow of concrete was from a Hackley gun, followed the procedure

(Testimony of Roy Wilkins.)

used in testing the speed of projectiles from large caliber guns, that is, two contacts are made which the projectile will short as it passes them. The current is applied through the circuit which passes through this with an element of an oscillograph, which is a sensitive ammeter leaving a record on a moving film. For the concrete he used a rubber hose six inches in diameter, the same size as the concrete ejection pipe and put in the rubber hose iron electrodes which came flush with the inside of the hose. These were connected with a battery and the oscillograph element in series and a record was taken of the current as the concrete was shot through. Mr. Wilkins stated that if the pipe is full, the concrete as it goes out will give a record on the film. If the pipe is empty it gives no record at all. If the concrete went out in plugs or slugs, it would give a hump and then drop back to zero and then drop back and give another hump as each went by. As concrete is mixed with air it gives a deflection that is not as great part way up. If it is perfectly uniform it gives a perfectly uniform straight line. If it is [412] broken up or the concrete changes —the mixture of the concrete and the air changes— it gives a wavy line. From these tests you can determine the exact nature of the flow and about its speed.

He had a drawing of the apparatus used in making these tests which shows the electrode arrangement and the rubber pipe to which he had referred. There were two sets of electrodes marked the first

(Testimony of Roy Wilkins.)

and the second. They were put in the pipe in a position close to the gun and the first straight stretch of it is shown on the drawing at the positions designated by letters A, B, C, and D. The electrodes B and C are the lower ones and the front and back electrodes are designated on the drawing as 1 and 2. He had a record of the test to which he had referred. It is a record across the two bottom electrodes of the second section B and C and the two top electrodes of the second section together with a sixty cycle timing wave which is taken off the regular battery circuit and traced on the film so that sixty of the cycles will represent one second and he had counted them off and so marked them on the drawing in red pencil. This blue-print represents the time that the concrete flowed under the action of compressed air from the Hackley gun during the tests which he personally made and recorded, and he said the blue-print correctly represents what took place for about twenty and a half seconds.

Whereupon the drawing illustrating the apparatus of the test was offered in evidence as Defendant's Exhibit 188 and the oscillograph record as Defendant's Exhibit 189.

Explaining the exhibit 189 further. Mr. Wilkins said "When the pipe is completely full the deflection from the zero [413] which is indicated at the start would extend nearly across the film. It was a solid concrete, as concrete flows out without any admixture of air. In this, it indicates that "the concrete is mixed on the bottom with air to a great

(Testimony of Roy Wilkins.)

enough extent to drop down that deflection about halfway. On the top there is much more air that gives it more of a wavy motion and very much less deflection. Such little jumps as are shown in these places indicate that more current would pass through it and there is more evidence at the back end of the film where the pressure drops somewhat. Such an indication as this indicates that there was more concrete went through between those electrodes at that time."

"The whole film indicates that the flow is practically uniform with a mixture of air which remains the same."

Q. Do I understand from your testimony, then, that this oscillograph record, exhibit 189, represents in the solid line the solid concrete or more solid portion of the concrete?

A. More solid than at the top.

Q. And that the wavy and broken line represents the upper surface of the flow?

A. Not the upper surface. It still had concrete in it to carry the current. It had more air and less concrete.

Q. Now, why did you try gauges along the pipe to determine what was taking place?

A. For two reasons. First, the gauges are unsatisfactory and not fast enough to detect the changes that we desired measured and, second, because any pressure readings taken by a gauge only indicate the pressure at that point and not the nature of the flow.

(Testimony of Roy Wilkins.)

Q. What was the result of your findings by these tests? [414]

A. The general conclusions were that the concrete flowed through the pipe with a proper supply of air, practically a uniform mixture of air and concrete, somewhat denser at the bottom. That if the air pressure dropped, you could make it vary somewhat. However, it was still a mixture of air and concrete.

Q. Did you ever encounter any slugs or plugs such as Mr. Ray, plaintiff's expert has referred to?

A. There were not.

The COURT.—Do you mean that this was a continuous flow of the mixture. I want to know if this was a continuous flow of this mixture.

Mr. TOWNSEND.—The Court desires to know if this was a continuous flow of the concrete material through the pipe, or was it separated?

A. This particular record so indicates.

Q. Indicates what?

A. That it was a continuous flow of the mixture of air and concrete.

Q. And did you observe the concrete flowing or issuing from the discharge pipe? A. I did.

Q. And how did that correspond in appearance with your scientific record here?

A. It corresponds to my mind exactly in that it flows out of the end of the pipe much the same as the discharge from a deep well turbine pump. I would say.

The COURT.—Well, how is that.

(Testimony of Roy Wilkins.)

The WITNESS.—It has a uniform flow without any spurts or dumps and not necessarily solid. [415]

Q. What is the relative conductivity of concrete and air?

A. Air has a very low conductivity. Usually it is not measurable on the ordinary instrument. This particular concrete had a conductivity of about—in other words, its resistance was about 1200 ohms per foot cube.

Q. Then I understand that the conductivity of concrete is very much greater?

A. Very much greater.

Q. Were you present at the tests conducted last Wednesday at the east portal of the Sunset tunnel?

A. I was.

Q. In San Francisco? A. I was.

Q. Did you observe those tests? A. Yes.

Q. Did you take any photographs at the time of those tests? A. I did—movie pictures.

Q. And have you the record here of those tests, of what is called the Smith gun? A. I have.

Q. Will you produce them and explain to the Court what they show and mean?

A. We have a print from a movie film taken by a small Sept hand camera—that is a hand motor camera. And I have marked them "September 7, 1927, Smith Gun Concrete," because that is the time they were taken.

The COURT.—Well, have him tell us what was done.

(Testimony of Roy Wilkins.)

Q. Tell us what took place, Mr. Wilkins, will you please, and what you have recorded there.

A. We have one film of water on it. [416]

Q. Will you show that to the Court, and I will offer that in evidence as Defendant's Exhibit No. 190.

(Whereupon movie film was admitted in evidence as Defendant's Exhibit 190.)

The WITNESS.—The second shows a mixture of cement and water designated as grout.

Mr. TOWNSEND.—I offer the second film as Exhibit No. 191.

(Whereupon movie film print was admitted in evidence and marked Defendant's Exhibit 191.)

The WITNESS.—And the third film of concrete of a mixture approximately of one, one and a half and three.

Q. Do these photographs correctly show what took place when the different materials you mentioned were driven through that machine?

A. To my mind they do, yes, sir.

Mr. TOWNSEND.—I will offer that photograph as Defendant's Exhibit 192.

(Whereupon movie film print was admitted in evidence as Defendant's Exhibit No. 192.)

Q. Did you see the operation of the machine?

A. I did.

Q. Do you know what you might use to drive the concrete out of it? A. Compressed air.

Q. I might ask you one more question, Mr. Wil-

(Testimony of Roy Wilkins.)

kins, in regard to the rate of travel at the time that you made your oscillograph record?

A. At the point that the tests were taken it was between fifteen and twenty feet a second.

Q. Assuming twenty feet a second and you have shown—have you twenty seconds of record on that tape? [417] A. Yes, sir.

Q. That would represent 400 feet of lineal travel of the concrete passing over those electrodes at that time? A. Yes, sir.

The COURT.—Cross-examine.

Cross-examination.

(By Mr. WILLIAMS.)

Q. Now, you were asked whether some of these things or this material—this concrete material passed through the discharge duct as a continuous flow. Do you mean by that a flow of solid mass of concrete, or do you mean a concrete mixture intermingled with air?

A. It is a concrete mixture intermingled, aerating, I believe is the correct word.

Q. Now, that aeration, if you want to call it that, was not entirely regular when you had somewhat less air, pressure, is that right?

A. If you dropped the air pressure low enough the pipe would plug.

Q. If you did not drop it low enough the plug but made it somewhat lower than under the conditions that you normally or generally employed there, then there would become an irregularity, would there? A. There would.

(Testimony of Roy Wilkins.)

Q. And your oscillograph demonstrates that, doesn't it? A. It shows it, yes.

Q. And the air pressure which you employed and the quantity of air which was passed through there could be varied then in such a way as to make the concrete pass in irregular masses or in such a way as to make it pass in [418] what you would call a continuous stream, could it?

A. Not in that practical operation.

Q. But in accordance with your idea, that is the case, isn't it? A. Yes, sir.

Q. Now, you have produced here one oscillograph record showing twenty seconds, was it, of operation?

A. Twenty and a half seconds, yes, sir.

Q. Is that the only oscillograph record that you made? A. That is the only one that long.

Q. Well, did you make others shorter?

A. I made it shorter and watched it visually. You can watch it visually.

Q. I am not asking you about that. You made other oscillograph records did you? Did you make several?

A. There were at least three or four, yes, sir.

Q. Were there more than three or four?

A. About four, I should say.

Q. Well, were there more than four?

A. Yes, sir.

Q. Now, isn't it a fact that you made several until you secured the result that you have produced here? A. No, sir.

Q. Is this the first that you secured?

(Testimony of Roy Wilkins.)

A. This is in the middle of it.

Q. What is that?

A. This was in about the middle of it.

Q. About the middle? A. Yes, sir.

Q. That is, you made some runs of which you haven't produced the record and then you made the one of which you have produced the record, and then you made some more afterwards [419] and those are not here, is that right?

A. Those were not presented, no, sir.

Q. Did you vary the conditions, for example, the quality or pressure of air, as between those successive tests? A. Not to a great extent.

Q. Well, to any extent? A. Yes, sir.

Q. Now, will you look at one of the pictures of this strip—do you call this film, or print, or what?

A. This is print from a movie film.

Q. Now, do I understand correctly that this little picture here, about 5/8 inch by one—do you hear me? A. Yes, sir.

Q. That this picture here about 5/8 inch by approximately an inch in size is a picture of a retaining wall of some structure?

A. It is the end of the Sunset—one of the ends of the retaining walls in the ends of the Sunset tunnel in San Francisco.

Q. And the discharge pipe that you refer to is the little pipe that runs somewhat angularly across this picture when held right side up, is it?

A. It runs practically horizontal with the top.

(Testimony of Roy Wilkins.)

Q. Can you point to one of these pictures and show me the discharge end that you talk about.

A. Right there (indicating) that runs along.

Q. And then this dark cloud—that is the photograph, is it, of material discharged from the pipe?

A. Yes, sir.

Q. And that cloud comes through, does it, from the first [420] picture to the last?

A. Yes, sir.

Q. This film that you have been talking about is the one marked Defendant's Exhibit 191, isn't it?

A. Yes, sir.

Q. How long was the discharge pipe with which you were operating in making these films?

A. It was between twenty and thirty feet. I did not measure it.

Q. Twenty or thirty feet from the tank part of the apparatus to the discharge end of the pipe, was it? A. Yes, sir.

Q. How much concrete in cubic feet or yards was discharged in making the whole of this oscillograph record marked—has that got an exhibit mark on it somewhere?

Mr. TOWNSEND.—188.

Mr. WILLIAMS.—188. I think that is wrong. Isn't that 189?

Mr. TOWNSEND.—I beg your pardon, 189.

A. Between one and two cubic yards.

Q. No more closer than that?

A. No, because the gun that was—that it was

(Testimony of Roy Wilkins.)

shot from holds about 2½ cubic yards and it was not quite full when they started.

Q. Was it nearer one yard or nearer two?

A. It was probably nearer two yards.

Mr. WILLIAMS.—That is all.

Redirect Examination.

(By Mr. TOWNSEND.)

Q. I meant to ask you, Mr. Wilkins, when and where and [421] with what apparatus was this test mare?—where this oscillograph record, exhibit 189 was made—was recorded?

A. It was made with the oscillograph in the Maloney's tunnel lining of the Pacific Gas and Electric Company.

Q. And when? A. On February 25, 1927.

Q. With what kind of a gun?

A. February 25, 1927.

Q. Did you say what gun—what kind of a gun was used? A. With a Hackley Gun.

Q. State whether or not it was used in ordinary operation or was it set up?

A. It was used in ordinary operation. The lining that went into the tunnel stayed there. The men that lined it didn't know that this shot was taken.

Q. By Hackley gun are you able to identify that by any of the drawings or photographs that we have here? A. Yes, sir.

Q. Can you, from this drawing I hold in my hand? A. Yes, sir.

(Testimony of Roy Wilkins.)

Mr. TOWNSEND.—The witness refers to the enlargement of the Hackley patent drawing exhibit 180, that is all.

The COURT.—Next witness.

Recross-examination.

(By Mr. WILLIAMS.)

Q. Who was present with you at this recording at the Maloney's tunnel job?

A. Mr. O. W. Peterson was one who helped take the records.

Q. Who else?

A. H. Keisling of the Pacific Gas and Electric Company was there. [422]

Q. Anyone else?

A. There were more there. I do not know their names now. There were workmen around there.

Q. Was Mr. Hackley there? A. He was not.

Mr. WILLIAMS.—That is all.

(Witness excused.) [423]

TESTIMONY OF O. W. PETERSON, FOR DEFENDANT.

Mr. O. W. PETERSON was the next witness called on behalf of the defendant.

Mr. Peterson is the Engineer of General Construction with the Pacific Gas and Electric Company, is 46 years old, and resides at Oakland, California. He is familiar with the methods in vogue in the last few years in lining tunnels and in transportation of materials by compressed air. His first

(Testimony of O. W. Peterson.)

compressed air experience was obtained in Southern California where he did a good deal of underground water measurement and surface water measurement and checked up a great many wells—made measurements where wells were being pumped by compressed air. Subsequently he observed the use of compressed air in the lining of the Twin Peaks tunnel; the Halsey tunnel of the Pacific Gas and Electric Company, and following that practically all the other jobs or a good many other jobs in Northern California. He personally followed the lining of three important tunnels in the last several years for his own company. He also used compressed air in connection with pumping from deep shafts where the pumps were inadequate to raise the water to the surface. He has used air a good deal in driving tunnels and building pen-stocks and doing a great many other construction operations. He did not do water lift work himself but observed the water lift operations in Southern California. He was checking up quantities of water in wells and the water table, and so forth, and observed the way the water came out of the wells. This was in 1902. According to his observations the water generally came out in a uniform aerated stream with an occasional surge over a rather long period. Sometimes there were no surges. Occasionally there would be a few bubbles or something of that sort that would break.

The witness was asked, "Just describe the air lift that was used there" and answered, "Well, the air

was ejected at [424] the low well, and the water aerated and was brought to the surface and came out in a stream of water with air."

Q. In your work in Southern California you said that you made certain measurements in relation to flow, and so forth? What was the general plan followed?

A. You mean of underground flow?

Q. Yes.

A. We put down an upper well—a central one and then on the arc of a circle we put three or four lower wells assuming that the water was traveling down a river valley or something of that nature and we decided to explore the rate at which water flowed forty or fifty feet below the ground surface; also the direction; and we placed electrodes, which are metal rods, in these lower wells with wooden insulators around them and we connected up from the casing to these rods—made a connection there to an ammeter and then we put a salt solution in the well, and we determined the time it took to reach the lower wells and also the direction of the flow, and from that information and from samples of materials obtained we could make an estimate of the quantity and direction of the underground flow.

The COURT.—What is this for?

Mr. TOWNSEND.—It needs just one more question to connect it up and show that it was similar to the wells method employed.

Q. Did the saline solution decrease or increase the conductivity of the water?

(Testimony of O. W. Peterson.)

A. Increased the conductivity. When the salt solution reached one of the lower levels-- [425]

The COURT.—(Interrupting.) I cannot see where this is important in this case. He is speaking, as I understand, of determining the flow of underground current. We want something with reference to lifting and conveying material.

Mr. TOWNSEND.—This is material on the measurement of liquids flowing through.

The COURT.—Proceed and we will see if it is material.

Q. Did that method of measuring electrically the flow of underground currents—was it analogous to or nonanalogous to the method of Mr. Wilkins as just described?

Mr. WILLIAMS.—I object to that as calling for a conclusion. If he wants to state the facts as to what he did, I think it for the Court to state whether it is analogous or not.

The COURT.—What are you trying to prove by this witness?

Mr. TOWNSEND.—I am going to lead up to other points. I want to show that this method followed by Mr. Wilkins was a very natural and proper scientific method of determining the flow and character of—

The COURT.—(Interrupting.) If this witness knows anything about it, ask him.

Mr. TOWNSEND.—I have asked him.

Q. Is that method that you used there like, or unlike or similar to or dissimilar from the method

(Testimony of O. W. Peterson.)

Mr. Wilkins described in determining the flow or character of flow of concrete through a pipe?

Mr. WILLIAMS.—I object on the ground that that is immaterial and on the ground that it is incompetent.

The COURT.—Sustained. If you want to have this witness corroborate the method that the witness Wilkins used in measuring the flow, ask him about it, if he knows. [426]

The WITNESS.—I have observed the operation at Maloneys that Mr. Wilkins testified to.

Q. You did? A. Yes, sir.

Q. And what were the working conditions under which this test was made?

A. The regular working conditions of placing concrete in the tunnel.

Q. How was the concrete coming out of the pipe? In a continuous flow, or otherwise?

A. In a continuous flow.

Q. And was that concrete wet or dry?

A. Wet concrete.

Q. What do you understand to be dry concrete?

A. Dry concrete is that which has to be tamped.

Q. Could dry concrete be discharged through that apparatus? A. No, sir.

Q. What have you to say as to the theory of Mr. Ray that the concrete in the Hackley gun travels through the pipe in the form of slugs?

A. It has been my observation that the concrete comes through in a uniform flow of the concrete and compressed air.

(Testimony of O. W. Peterson.)

Q. What would be the result of a so-called slug action referred to by Mr. Ray?

A. It would plug the pipes.

Q. And what does that do?

A. That stops the works and it is necessary to take the pipes apart and get out the concrete.

Q. What material has about the same handling characteristics as concrete? [427]

A. I would say a sticky mud containing considerable clay, commonly called muck, would be quite similar with a moderate amount of moisture and the similarity would be even greater with the rock embedded in that, commonly called spoil.

Q. Have you ever known of the Hackley gun being used for conveying anything but concrete?

A. Yes, sir.

Q. What material? A. Grout.

Q. And where was that done?

A. That was done on head three tunnel and head four tunnel of the Pacific Gas & Electric Company and the Maloneys tunnel of the Pacific Gas & Electric Company.

Q. Did you see the Hackley gun blow grout?

A. Yes, sir.

Q. And how did the grout come out of the gun?

A. Just the same as the concrete came out.

Q. What did you do with the Hackley gun to make it into a grout gun?

A. Well, the concrete gun has—we used there a six or seven inch pipe which was not convenient to grout with. We used grout with a hose of

(Testimony of O. W. Peterson.)

about two or three inches in diameter and so we simply put a plate on the end of the gun and the nipple welded in that plate for convenient connection of the hose line, and used it as a grout gun.

Q. I show you two pictures here which have been identified as Defendant's Exhibits 181 and 182 for Identification and ask you if you know what they represent?

A. They represent the Hackley gun as used in grouting work [428] at Pit Four tunnel.

Q. Is that used ordinarily in the ordinary course of practice?

A. Yes, sir, where we use the concrete guns for grouting, especially in lava formations where large volumes of grout are required.

Q. Do the pictures show the reducer for the grout?

A. Yes, sir. In the first picture we have the reducer attached to the gun.

Mr. TOWNSEND.—The witness refers to exhibit No. 181 for Identification.

The WITNESS.—In the second picture we have the grout gun on the ground alongside of it.

Mr. TOWNSEND.—We offer these pictures in evidence as Defendant's Exhibits 181 and 182.

(Whereupon photographs showing grout gun were marked Defendant's Exhibits 181 and 182 and received in evidence.)

Q. I show you an enlargement marked Defendant's Exhibit 166 for Identification. Tell us, if you know anything about that?

(Testimony of O. W. Peterson.)

A. This is a grout gun which I used in general grouting work. One of the several different types of machines. I happen to know that it is the Canniff type grout gun, double cylinder conveyor and it is so arranged that grout can be put in one cylinder while the other is being discharged and it permits a fairly continuous operation.

Q. Just mark on there the air inlet to the blow pipe. A. The air inlet is marked "A."

Q. That is on the receptacle?

A. Yes. In this picture we also have an air inlet—

Q. (Interrupting.) "B"? [429]

A. "B," yes, sir.

Q. Is the apparatus of that drawing, exhibit 176 for Identification applicable to or not applicable to the conveying of concrete?

A. It is applicable to the conveying of concrete, yes, sir.

Q. Have you ever seen a machine like that blowing concrete? A. Yes, sir.

Q. Did you have anything to do with making the original—the drawing of this photostat?

A. I had the drawing made.

Q. And is that photostat a correct respresentation of the machine that you have operated?

A. Yes, sir.

Mr. TOWNSEND.—I offer exhibit 176, your Honor.

The COURT.—Is it not in already?

Mr. TOWNSEND.—Only for identification.

(Testimony of O. W. Peterson.)

The COURT.—It may be admitted.

(Whereupon enlarged drawing of grout gun was admitted in evidence as Defendant's Exhibit No. 176.)

Q. Now were you present the other day at the official tests made in San Francisco at the portal of the Sunset Tunnel, September 7th.

A. I was present at tests made at that portal of the Sunset Tunnel.

Q. What machines were tested?

A. We tested a Smith type gun, 1872 patent, and a Canniff type gun.

Q. What were the results of those tests. Just briefly run through them.

Q. Well, we first tested the Smith gun with grout, and then [430] we made up a mixture which corresponded as closely as we could determine to the original Smith mixture and then we put through a regular tunnel mix that was being used. We next put through a grout mix—put a grout mix through the Canniff type gun and then we put a grout mix with rocks and with sand—or I should say with cement and sand and rocks—the maximum size of rocks in the case of the Canniff gun being one inch.

Q. What was the size of the Canniff outlet?

A. The Canniff outlet was two inches.

Q. Did you notice any difference in operation or similarity of operation, or otherwise, between the use of those guns or either of them when using one substance or the other?

(Testimony of O. W. Peterson.)

A. The action was similar in using the different substances.

Q. Exhibit 183, does that look familiar to you?

A. Yes, sir. It is the Canniff type gun with which we made the tests.

Q. That Smith gun is here, isn't it, Mr. Peterson, in evidence?

A. Yes, sir. It is in the basement of this building.

Q. And you say that machine is made according to the Smith patent? A. Yes, sir.

Q. And the Smith patent, that is here in evidence?

A. Yes, sir.

Q. Of 1872? A. Yes, sir.

Q. I will ask you on the photograph. Strike that out. You identify these exhibits—these photographs, exhibits 184 and 185?

A. Yes, sir. 184 shows the Smith gun as it was set up at the [431] time of the test, and Exhibit 185 also shows the Smith gun and the complete discharge line as set up at the time of the test.

Q. Now, will you look the photograph Exhibit 184, the inlet air pipe, and mark it by the letter C?

A. I have marked C at the inlet air pipe.

Q. Will you now mark the point or conduit through which the concrete or other material was admitted to the receptacle A, by the letter "D"?

A. Letter "D" is marked at the intake of the gun where the material went in.

Q. Now, will you just briefly describe what operations were gone through and what part you took in

(Testimony of O. W. Peterson.)

the conducting or in the conduct of those operations in connection with the Smith gun and also with the Canniff gun?

Mr. WILLIAMS.—I object to that, your Honor, as asking for a question that is merely repetition. He stated that once.

Mr. TOWNSEND.—He said that he saw them. I want to know what was done now.

The COURT.—He may answer briefly.

Q. Yes.

A. Just before the test started I went up and read the gauge on the compressor showing that it was 103 pounds to the square inch. I then went down with a couple of men and attended to the mixing of the materials that were put in so that we would know what went into the gun. That was taken over to the gun. The plug in each instance, was put on after the materials were inside. The air pressure was introduced at the top and when the full air pressure was on we opened the cock, opening the valve quickly and immediately [432] the materials were discharged from the gun. I do not want to say immediately, but they were promptly discharged.

Q. That valve that you speak of as a quick opening valve, was that a slide type valve?

A. That was a slide type valve with a handle so that it can be given a quick jerk and opened practically instantly.

Q. Tell us what materials you ran through the Smith gun under compressed air at that time?

(Testimony of O. W. Peterson.)

A. We used first a grout of one part cement and two parts sand mixture. We then used the Smith formula mix of one part cement and one part sand and three parts rock; the parts being by weight and then we did three shifts of the volume by water. That was the mix used as nearly as we could duplicate those conditions.

Q. Was a shot of water run through the machine first?

A. Well, we washed the machine first before we started, to be sure that there was no obstruction of any kind of that sort. As far as that goes, first of all we applied air through and then we applied water and then the grout and then the concrete mixture.

Q. Then what did you do with the Canniff gun?

A. With the Canniff gun—I should say with the Canniff gun we blew air through and then we blew an ordinary grout mixture with the Canniff gun with a grout mix of one part cement and two parts sand, and then we blew a concrete mix consisting of—with rock of the maximum size of one inch.

Q. Did those tests satisfy you as to the practicability or otherwise of the Smith gun as a gun to shoot concrete?

A. Yes, sir. I would say—I would use it on a large job. I would make a bigger gun but just the same type. The [433] principle was satisfactory. It showed that it had the proper structure or proper general proportions and features to shoot

(Testimony of O. W. Peterson.)

concrete. That was what we were interested in doing.

Q. Have you samples of the product that was worked on that day? A. Yes, we have.

Q. Please produce them and explain them to the Court.

A. We have here one sample which is marked here "Mix one one three, Smith patent mix." I marked my initials on it, "O. W. P. September 7, 1927." There was no particular pains taken to preserve the character of the concrete. We just wanted to get a sample of the materials used.

Mr. TOWNSEND.—I offer this as Defendant's Exhibit 193.

(Whereupon sample of mix was admitted in evidence as Defendant's Exhibit 193.)

The WITNESS.—We have here sample No. 2, marked "Rock mix, one, two and a quarter, four and three-quarters referring to the cement, sand and rock, "O. W. P. September 7, 1927." These were samples obtained from materials which were put through the Smith gun at the Sunset Tunnel on September 7th.

Mr. TOWNSEND.—I offer the second sample as exhibit 194.

(Whereupon sample of mix was admitted in evidence as Defendant's Exhibit 194.)

Q. Now, you have referred, Mr. Peterson, to the placing of a reducer on a Hackley gun when you wanted to convert the Hackley gun from a concrete

gun to a grout gun. Have you that reducer here in court? A. Yes, sir.

The COURT.—I cannot see the materiality of all these [434] exhibits. He said that he used a reducer. Now, if he did, would it add anything to show the reducer? If his word is not to be taken as to the reducer, why the exhibit of a reducer would not help any.

Mr. TOWNSEND.—I was carrying out the strict production of the original.

The COURT.—Oh, the infinite detail of all of this I suppose is necessary. We will suspend now until two o'clock.

(Whereupon an adjournment was taken at 12 o'clock M. until 2:00 P. M. of the same day.)

September 14th, 1927, 2:00 P. M.

Court convened pursuant to adjournment.

All parties present.

O. W. PETERSON, a witness called on behalf of the defendant, resumed the stand for further examination:

Mr. TOWNSEND.—Judge, I was just offering the reducer that goes on the Hackley gun at the time that we closed. With the offer of that I will conclude.

The COURT.—How is that?

Mr. TOWNSEND.—I shall just offer a certain reducer that has been used on the Hackley gun, in converting the Hackley gun to a grout gun.

The COURT.—Yes?

(Testimony of O. W. Peterson.)

Mr. TOWNSEND.—And ask that it be marked our next exhibit and conclude.

The COURT.—Well, if there is no objection it may be marked and admitted, although the Court looks upon it as utterly useless. [435]

(Whereupon reducer used on Hackley gun was marked Defendant's Exhibit 191.)

The COURT.—Cross-examine.

Cross-examination.

(By Mr. WILLIAMS.)

Q. How long have you been connected with the Pacific Gas & Electric Company?

A. Off and on since 1913.

Q. Now, you have been speaking of a Canniff grout machine. How early in your engineering experience did such a machine first come to your attention? A. About 1920.

Q. Not before that? A. About that time.

Q. Is that when you first saw one of them used?

A. Yes, sir.

Q. Have such Canniff machines been used on work of the Pacific Gas & Electric Company?

A. Yes, sir.

Q. Now, on June 29, 1916, the Pacific Gas & Electric Company entered into a contract between the plaintiff here or its agent, in accordance with which the Pacific Gas & Electric Company acquired one of the McMichael machines for the pneumatic placing of concrete on division No. 7, South Yuba tunnel for the construction of that tunnel in Placer County, California, did it not?

(Testimony of O. W. Peterson.)

Mr. TOWNSEND.—I object to that as not proper cross-examination.

The COURT.—Sustained.

Q. Mr. Peterson, in what capacity are you employed by the Pacific Gas & Electric Company? [436]

A. I am in charge of their general construction work. You call me an engineer. I am as much a superintendent. I direct the work. We do most of our own work.

The COURT.—Proceed.

Q. Did the Pacific Gas & Electric Company ever use, to your knowledge, a McMichael machine furnished by the plaintiff or its agent?

A. I cannot say as to that. I do not know. I saw a machine of that type but I do not know who furnished it.

Q. On what work did you see that machine?

A. On a job in Placer County, California.

Q. Will you describe that machine?

The COURT.—Well, what is the object of it? I cannot see any.

Mr. WILLIAMS.—I would like to show the interest of this witness. The interest and the bias of this witness. I would like to show that his company first acquired their knowledge of this method of handling concrete by the use of one of the plaintiff's machines. I want to show further that they are now using infringing machines and have been notified of that infringement.

Mr. TOWNSEND.—I object to that.

(Testimony of O. W. Peterson.)

The COURT.—Anyhow he has described it sufficiently. We won't go into the details. He says it is a McMichael machine. That fixes it to be one of your machines.

Q. Now, since that time the Pacific Gas & Electric Company has used so-called Web-Cox machines on some of its work, has it not?

A. One was used, not by the company but by a contractor.

Q. Doing work for the company? [437]

A. Building a tunnel for the company, yes, sir.

Q. Was that machine like the one involved in the suit of this plaintiff against the Ulen Contracting Company of New York and as shown in the drawing which I now call to your attention?

Mr. TOWNSEND.—I object to that as not proper cross-examination.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Will you describe the Web-Cox machine which the Pacific Gas & Electric Company used, as you say?

Mr. TOWNSEND.—I object to that, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Now, since that time, has the Pacific Gas & Electric Company used Hackley machines such as are illustrated on Plaintiff's Exhibit No. 13?

A. Substantially as shown there.

(Testimony of O. W. Peterson.)

Q. Has the Pacific Gas & Electric Company been notified or warned that its use of such machines is an infringement of the McMichael patent in suit?

Mr. TOWNSEND.—Objected to as not proper cross-examination.

The COURT.—He may answer, if he knows.

A. I don't know.

Q. Is the Pacific Gas & Electric Company contributing to the expense of maintaining a defense to this suit?

Mr. TOWNSEND.—That is objected to as not proper cross-examination.

The COURT.—He may answer if he knows.

A. I do not know. [438]

Q. At whose direction have you come here from California?

A. Well, I came—at whose direction?

Q. Yes?

A. Well, I got here at the direction of the company or with their permission.

Q. At the expense of the company or at whose expense?

A. At the expense of the company, I expect.

Q. You are acquainted with Mr. Wilkins, are you, who testified here this morning?

A. Yes, sir.

Q. He is employed, is he, by the Pacific Gas & Electric Company? A. Yes, sir.

The COURT.—If you have any further cross-examination proceed with it, or I will tell the witness to leave the stand.

(Testimony of O. W. Peterson.)

Mr. WILLIAMS.—If the Court please, it will take me less time to look at my notes than it will to fill in with idle questions.

The COURT.—We have no time for you to read every question. We have no time for all those delays.

Q. Well, now, has the Pacific Gas & Electric Company engaged—is the Pacific Gas & Electric Company engaged now in similar tunnel lining or construction work?

A. It is engaged in construction work, but not in tunnel lining at the present time.

Q. Has it been frequently during your connection with the company or since 1920—has it been engaged frequently or more or less continuously in tunnel construction work?

A. Yes to a considerable extent. [439]

Q. Now, what kind of machines has the company used during that period—

A. (Interrupting.) 1920—pardon me?

Q. During the period—all of the period during which you have knowledge of the facts in the concrete lining of the tunnels which it has constructed.

A. From 1920 on or all of the time?

Q. From what?

A. You started out with 1920. I started with them before that or farther back.

Q. Farther back.

A. Just as far back as they used a McMichael type gun on an early job. Through a contractor

(Testimony of O. W. Peterson.)

a Web gun was used and subsequently in recent years the Hackley gun has been used.

Q. Now, are those all that have been used in the pneumatic placement of concrete by the Pacific Gas & Electric Company?

A. Substantially so. We have done a little filling you might say with the grout machine. Whether that would be called concrete filling or not, I can't say.

Q. What do you mean by "filling"? Do you mean by that filling fissures or leaks or cracks?

A. Sometimes we use material a little bit with the grout machine. That has been incidental.

Q. Now, can you say why it is that during all this period—let me ask you first—can you state approximately or generally what the cost of this tunnel lining work has been in which the Pacific Gas & Electric Company has been engaged during the period you have described? [440]

A. I cannot say as to that, except that it has been a considerable amount of money.

Q. Well, does it involve millions of dollars, or less?

A. Oh, I don't know. Less than millions.

Q. Hundreds of thousands? A. Yes, sir.

The COURT.—You have gone far enough along that line. Confine yourself to the examination in chief.

Q. Now, why is it that the Pacific Gas & Electric Company in the placement of concrete in connection with their tunnel work has not our machines? You

(Testimony of O. W. Peterson.)

have designated the Canniff grouting machines and tanks such as this Smith patent apparatus shown on defendant's photograph, Exhibits 184 and 185 if I may see them?

Mr. TOWNSEND.—I object to that, your Honor, as not proper cross-examination as to why.

The COURT.—Sustained. I do not see that it is material.

Mr. WILLIAMS.—Exception.

The COURT.—It will be noted and taken. Proceed.

Mr. WILLIAMS.—That is all.

The COURT.—Call your next witness.

Redirect Examination.

(By Mr. TOWNSEND.)

Q. Just may I ask a question or two. Were you asked by anyone outside of your company to attend here?

A. I was asked by the Storrie Company to attend, yes, sir.

Q. And is all of the concrete lining in the tunnel done by means of the guns here employing compressed air? A. The guns here?

Q. Is all the lining in a tunnel done by means of compressed [441] air shooting concrete?

A. All except that portion which can be poured by gravity directly from cars, which is just the floor and a small portion of the footings at the side of the tunnel.

Q. Was the McMichael gun that you say was used in Placer County a successful gun?

(Testimony of O. W. Peterson.)

A. The company—no, sir.

Mr. TOWNSEND.—That is all.

The COURT.—The next witness.

Recross-examination.

(By Mr. WILLIAMS.)

Q. You were not connected with the company at the time of that work in Placer County, were you?

A. No, sir.

Q. You didn't see it done?

A. I visited the job during its progress.

Q. What is the basis of your saying that it was not satisfactory, not because of your own knowledge of the facts, was it? A. Yes, sir.

Q. When did you acquire that knowledge?

A. At the time of my visit.

Q. In what respect was the work unsatisfactory?

A. Well, they had a great deal of trouble with wearing of pipes and plugs and the costs were a little bit higher than hand work which they were doing in similar tunnels. So they discontinued when they finished this one tunnel and did the remainder of that development by hand. [442]

The COURT.—Call your next witness.

The testimony of William H. Larkin, Jr., taken by deposition at New Haven, Connecticut, commencing at 2:00 P. M. of September 9, 1927, is here reproduced in full in question and answer form. [443]

DEPOSITION OF WILLIAM H. LARKIN, JR., FOR DEFENDANT.

Deposition of WILLIAM H. LARKIN, Jr., taken at New Haven, Connecticut, at two o'clock P. M. of September 9, 1927.

Direct Examination.

(By Mr. GATES.)

Q. Your full name is William H. Larkin, Jr.

A. Yes.

Q. Will you kindly state your age, residence and occupation.

A. Age 56, residence 285 Central Avenue, New Haven, Connecticut, occupation, power engineer; general division of the United States Rubber Company.

Q. State as briefly as you can your engineering experience.

A. A graduate in engineering Worcester Polytechnic Institute in 1893 with degree of M. E. Worcester Polytechnic Institute in 1903. Member of American Society of Mechanical Engineers. Member of Plant Engineer's Club of Boston. Ten years mechanical engineer with United States Lighthouse establishment, Boston. Seven years chief mechanical engineer Frank B. Gilbreth Company, constructing engineer at Boston. Fifteen years mechanical engineer United States Rubber Company, New York City.

Q. Are you the William H. Larkin, Jr., mentioned as patentee in United States letters patent

(Deposition of William H. Larkin, Jr.)

No. 894,813, dated August 4, 1908, and United States letters patent No. 951,754 dated March 8. 1910? A. I am.

Q. Were you the sole inventor of the invention covered by these two letters patent?

A. No. The invention was made in collaboration with [444] J. W. Buzzell.

Q. I show you a photostatic copy of an affidavit bearing at the top the receipt stamp of the United States Patent Office. The date of the affidavit is August 30, 1909, and I ask you if the facsimile of the signature attached to the second page of this affidavit is a facsimile of your signature.

A. It is.

Q. Did you make such an affidavit at that time, namely August 30, 1909? A. I did.

Q. Have you just read this affidavit through carefully, this photostatic copy. A. Yes, I have.

Q. Are the facts therein stated true and correct?

By Mr. COX.—Objected to as calling for secondary evidence and not for facts within the knowledge of the witness at the present time. If facts within the knowledge of the witness are to be introduced in this case, the witness should be asked to state them and not referred to an *ex parte* affidavit made eighteen years ago.

A. They are.

Q. The affidavit refers to certain sketches dated 1904 and 1906 respectively, and I show you, Mr. Larkin, photostatic copies of those sketches, exhibit "A" and exhibit "B." I will ask you who made the originals of those sketches. A. I did.

(Deposition of William H. Larkin, Jr.)

Q. In whose handwriting or hand painting are they? A. Mine.

Q. When did you make those sketches? [445]

A. The originals or the copies?

Q. The original sketches?

A. The originals were made October 14, 1904. I note the date on the sketch marked exhibit "B" is December, 1906, in my handwriting. It is to be noted that the 1904 sketches are concerned mainly with mathematical computation, while the 1906 sketches show the proposed form of the conveyor apparatus. One original sketch was made in October, 1904, the other original was made in December, 1906.

Q. Can you produce the originals?

A. I cannot.

Q. Do you know where the originals now are?

A. I do not.

Q. Are these original sketches the ones you referred to in your affidavits in the following language: "said original sketches I am retaining in my possession for future use in possible litigation of interference"? A. They are.

Q. Did you retain possession of these sketches?

A. I did, for a time.

Q. Then to the best of your recollection what did you do with them?

A. It is my belief that they were forwarded to Emery and Booth of Boston, patent attorneys, which is the same concern now known as Emery, Booth, Janney & Varney.

(Deposition of William H. Larkin, Jr.)

Q. Why did you forward them to this firm?

A. They were forwarded to Mr. Emery at the request of Mr. J. W. Buzzell, my associate, for use in connection with other patent work under way. [446]

Q. Have you or Mr. Buzzell, your associate, requested the firm of Emery, Booth, Janney & Varney to find these sketches for you in their files?

A. Yes.

Q. What was the result of this inquiry?

A. Emery & Booth were unable to find any trace of the sketches, but I understand that they found a reference indicating that they had been returned to Mr. Buzzell.

Q. Do you know what Mr. Buzzell did with these sketches?

A. Mr. Buzzell is not certain that they ever were returned to him, but states that it is quite possible and if so he in all probability turned them over to Ernest W. Marshall, patent attorney of New York in connection with work that Marshall was doing for him at that time.

Q. Have either you or your associate Mr. Buzzell made inquiries respecting these papers of Ernest W. Marshall?

A. I understand that Buzzell asked Marshall to make a search, which produced no result. Marshall stated that many of his old files were destroyed in a fire.

Q. Have you made any effort to locate them at the request of counsel before this deposition was taken?

(Deposition of William H. Larkin, Jr.)

A. I have searched through some old files at my residence and certain rolls of drawings preserved during the last twenty years, but without result.

Q. Have you looked in every place where these sketches are likely to be if still in existence?

A. I have.

Q. With what results? A. No results.

Q. What is your best judgment as to what has become of these [447] sketches?

A. In my opinion, and from experience I have had with the general policy of business houses in handling old files, I should say that it is quite likely that they were destroyed in Emery & Booth's storage, although it is always possible that they reached Marshall and were destroyed in the fire as he mentioned.

Q. Would it be fair then to say that according to your best recollection these sketches have somehow been either lost or destroyed? A. Yes.

Q. I show you photostatic copies of these sketches and ask you if those are true and correct copies of the originals.

A. The original sketches were made between 21 and 23 years ago. The copies were made about 18 years ago. Keeping these facts in mind I can say that, to the best of my belief, and as far as my memory can serve me, the copies are true duplicates of the original in a general way.

Q. The photostatic copies shown the witness are photostatic copies of the blue-prints filed in the Patent Office attached to the affidavit of August 30,

(Deposition of William H. Larkin, Jr.)

1909. I will ask you, Mr. Larkin, if those blue-prints filed in the Patent Office were prepared from the original sketches, either by you or under your direction?

A. My remembrance is that I made these copies at Laporte, Indiana, in 1909 by sketching with India ink or ordinary tracing cloth. The blue-prints were made from these tracing cloth sketches.

Q. Bearing in mind therefore the answer to your last question, can you not now say that these copies are true and correct [448] copies of the originals?

A. No, because the copies are simply prints of a tracing which was made by memory of the original drawing or sketches.

Q. This tracing and these blue-prints you know were to be filed in the Patent Office, is that not correct?

A. My memory of the matter is that I was asked to make the sketches without knowing exactly what was to be done with them. It is entirely probable that at the time I may have known that they were to be used in connection with the affidavit.

Q. I suppose you did your best in making this tracing to reproduce the original drawings exactly?

A. Yes, keeping in mind that what I was trying to emphasize was method rather than detail of machinery.

Q. You have no doubt, however, but that these sketches contain substantially the drawings and the calculations of the originals?

(Deposition of William H. Larkin, Jr.)

By Mr. COX.—I submit that this line of examination has already gone too far and object to it all as incompetent for the reason that the witness can merely state his recollection after a lapse of eighteen years or more and has stated that recollection fully.

A. No.

Q. In 1909 when these tracings were made where were the originals?

A. I have no definite knowledge; as all work at that time was being done by Emery & Booth, presumably in their files. I should say that it would have been reasonable to expect to find them in Emery's files. It is evident [449] that they were not there as I was asked to make copies from memory of these same originals.

Q. So that is 1909 when the tracings were made you did not know where the originals were?

A. No.

Q. Did you make any effort to locate them at that time to your recollection?

A. I do not remember.

Q. In the recent search among your papers which you have testified you have made did you come across these original sketches? A. I did not.

Q. What is your best judgment as to what has become of them?

A. The original sketches were lost as previously described in this testimony, but the tracing made from memory of these original sketches have been lost between the files of Emery & Booth, J. W. Buz-

(Deposition of William H. Larkin, Jr.)

zell and myself. It would be difficult to make any satisfactory guess. It should be kept in mind that all this took place nearly twenty years back.

There is introduced in evidence as Defendant's Exhibit 70 and 70a the sketches, Exhibit "A" and Exhibit "B," dated respectively October 14, 1904 and December, 1906.

By Mr. COX.—Objected to as incompetent and being merely the recollection of the witness of sketches said to have been made by him at dates from two years and eight months to nearly five years prior to the making of these sketches, said recollection based on the sketches themselves which were made subsequent to the filing of the application [450] for the patent in suit on January 14, 1907, and made at that time from memory. This objection also applies to the dates appearing on the sketches marked exhibits 70 and 70a.

Why were you asked Mr. Larkin to make these sketches at the time of the affidavit rather than Mr. Buzzell?

A. I at that time made all the drawings, calculations and did all of the engineering work in connection with the concrete conveyor.

Q. Would it be fair to say that from the beginning you had made the drawings and calculations in connection with the concrete conveyor?

A. Almost exclusively.

Q. At the time you made the copies of the original sketches for filing in the Patent Office how did

(Deposition of William H. Larkin, Jr.)

you fix the dates of October 14, 1904, and December, 1906, respectively?

A. I fixed these dates by consulting my diary, of which I have a series for some thirty-four years, since 1893.

Q. Will you please describe, Mr. Larkin, what the two sketches exhibits 70 and 70a disclose.

A. The apparatus shown on Exhibit "A" consists of a hopper for containing mixed concrete, on the upper part of which hopper is a sealable opening. From this opening leads a pipe intended to convey the concrete to a point where it is to be used. A compressed air receiver for holding air under pressure is shown at the left of the receiving hopper and connected to it by means of a pipe which is indicated. Operation as follows: A batch of mixed concrete is introduced into the hopper through an opening in the top. This opening is then sealed [451] and a suitable valve opened in the pipe leading to the compressed air tank, which allows the air to exert its pressure on the top side of the mass of concrete in the tank. This air pressure forces the concrete downward and into the pipe which is to convey it to the point of use.

The apparatus shown on Exhibit "B" consists of a double receptacle for receiving mixed concrete, it being the intention to use these two receptacles alternately. This for the purpose of saving time; in other words, while one was being filled with concrete the other was being discharged. At the top of these receptacles were placed sealable openings

(Deposition of William H. Larkin, Jr.)

and they were also provided with a mechanical means for closure at the bottom end. From each of these two receptacles led downward a pipe into a Y-shaped fitting, whose two branches led directly into a single conveyor pipe designed to carry the mass of concrete to the point of use. Above the two receptacles is shown an ordinary concrete mixer so arranged as to be capable of discharging into either receptacle or pressure tank as it is marked on the drawing. At the side of the receptacles near the top is shown a pressure pipe, suitably valved, so that at the proper time compressed air can be admitted to the top side of the concrete. It is also intended that steam under high pressure should be used if more convenient. The Y-fitting which leads into the conveyor pipe is also shown provided with a small syphon which is marked I on the plan and shown in detail by a small sketch which is also marked I. The purpose of this syphon was to [452] create a vacuum at this point in the pipe, which might tend to prevent arching of the concrete and choking in the conveyor pipe. This vacuum was to be obtained by the condensation of the expanded jet of steam where it entered the large part of the Y-fitting. The operation of this apparatus was designed to be as follows: The valve at the bottom of one of the receptacles was closed by the lever shown. The top opening was uncovered as shown. Mixed concrete was introduced into this open receptacle. The opening was then sealed by the use of the cover shown. Steam

(Deposition of William H. Larkin, Jr.)

or air pressure was then admitted to the pressure pipe shown near the top of the receptacle. The lower valve on the receptacle was then opened and the pressure on the top of the mass forced it downward and out of the conveyor pipe to the point of application. In the case of a tendency to arch in the tank or receptacle, or in case of choking in the conveyor pipe, steam was supposed to be admitted into Syphon "I" which by means of its vacuum action was supposed to have a tendency to keep the mass in motion.

Q. I hand you, Mr. Larkin, for the purpose of refreshing your recollection, if in fact your recollection is refreshed, printed copies of patents 894,813 and 951,754 and I will ask you if these patents disclose substantially the same idea as these sketches exhibit 70 and 70a. A. They do.

Q. I hand you, Mr. Larkin, a photostat copy of an affidavit dated January 12, 1910, and which bears at the top the receipt stamp of United States Patent Office and I ask [453] to have this marked for identification. Referring to this photostatic copy, Mr. Larkin, I ask you if the facsimile of the signature on page 2 is a facsimile of your signature? A. Yes, it is.

Q. Did you make such an affidavit at that time, namely January 12, 1910? A. I did.

Q. Mr. Larkin, will you please read into the record that affidavit of January, 1910, and state whether or not the facts therein specified are true and correct as of that date.

(Deposition of William H. Larkin, Jr.)

By Mr. COX.—Same objection as to questions before and the facts stated in the affidavit of August 30, 1909.

A. "William H. Larkin, Jr., being duly sworn, deposes and states as follows:

I am the William H. Larkin, Jr., who filed the above-entitled application for patent conjointly with Josiah W. Buzzell on January 25, 1909.

Prior to the 29th day of October, 1906, the idea occurred to me in the course of my duties that concrete or like segregated rock bearing, cementitious material might be conveyed by fluid pressure. Shortly thereafter and prior to October 29, 1906 I discussed this idea with the said Josiah W. Buzzell at South Boston, Mass., and as the result of said discussion we jointly invented and developed the method of conveying concrete and like cementitious material disclosed in the above-entitled application. As a result of said discussion, I made in the United States, sketches on or about October 14, 1904, illustrative of and disclosing the said invention and means whereby [454] the same could be carried out. Blue-prints of said sketches were attached to my previous affidavit filed in this case and executed about August 27, 1909, and marked 'Exhibit A.' Said sketches I am retaining in my possession for future use in possible litigation or interference.

Prior to October 29, 1906, and in conjunction with the said Buzzell, I reduced to practice the said invention in the United States by conveying concrete by fluid pressure in the United States, in the

(Deposition of William H. Larkin, Jr.)

manner described in my above-entitled application and as disclosed in the amendment accompanying the supplemental oath executed on even date herewith. I have carefully read a copy of the affidavit of Josiah W. Buzzell, filed in this case, and know the facts therein set forth to be true. I do not know and do not believe that the invention disclosed in the above-entitled application has been in public use or on sale in this country or patented or described in any printed publication in this or any foreign country for more than two years prior to the filing of the above-entitled application. I have never abandoned the invention disclosed in the above-entitled application.

Further deponent saith not."

A. (Continued.) The facts are true and correct as of that date.

By Mr. COX.—A further objection is made to the affidavits of August 30, 1909, and January 12, 1910, and the exhibits referred to therein, and also to the testimony of the witness relating thereto on the ground that the [455] same are irrelevant and immaterial, it being apparent that the apparatus which the sketches purport to illustrate is essentially different in construction and operation from that of the McMichael patent in suit No. 1,127,660, as the witness has stated in answer to direct questions.

Q. I ask that the Government printed copies of the Buzzell and Larkin patents 951,754 and 894,813 be marked as those copies which the witness has

(Deposition of William H. Larkin, Jr.)

used in refreshing his recollection in answer to previous questions. Refreshing your recollection with anything which in fact does refresh it, can you state when you filed your applications, or when the applications were filed which resulted in the patents to yourself and Mr. Buzzell numbered 894,813 and 951,754 respectively?

A. Yes, the application of the first named patent was filed June 13, 1907, and the one for the second patent was filed January 25, 1909.

Q. What have you used in order to refresh your recollection in answering the last question?

A. I have used the printed dates of application shown on the Patent Office specification.

By Mr. COX.—If the dates given by the witness are to be used to prove the filing dates of the applications for the patents mentioned, the testimony is objected to as not the best evidence, the said filing dates being a matter of record in the United States Patent Office. This objection also applies to the subject matter of the said applications, which is not established by the subject matter of the resulting patents. [456]

By Mr. GATES.—The witness in referring to the printed dates of application shown in the Patent Office specification referred to printed copies of U. S. letters patent 894,813 and 951,754. The evidence as to dates of filing these applications is not being used to establish such filing dates *per se*.

Q. Bearing in mind the statement on the second page of the affidavit of January 12, 1910, that "I

(Deposition of William H. Larkin, Jr.)

have never abandoned the invention disclosed in the above-entitled application" which statement has been described by the witness as a correct statement as of that date, and bearing in mind the filing dates of your applications to which you have just testified, is it not fair to say that at no time between 1904 and the time you and Mr. Buzzell filed your applications for patents Nos. 894,813, 951,754 did you abandon the idea disclosed in those patents?

A. It is fair to say, that we did not abandon the idea during the period mentioned.

Q. I will ask you, Mr. Larkin, to give the numbers of the United States patent issued to you and Mr. Buzzell for Concrete Conveyor.

A. The number of the patent for conveying concrete pneumatically is 894,813. The subsequent patent taken out covering the method is 951,754.

Q. I show you photostat copies of pages 579 and 580 of the "Engineering News" of November 25, 1909, containing an article on "Experiments on conveying concrete through pipes under air pressure," by J. W. Buzzell and William H. Larkin, Jr., and I ask you if you are the [457] William H. Larkin, Jr., therein referred to? A. I am.

Q. Did you in fact on or about November 25, 1909, write an article for the "Engineering News" on the "Experiments on conveying concrete through pipes under air pressure"?

A. Yes, collaborating with J. W. Buzzell of East Orange, New Jersey.

(Deposition of William H. Larkin, Jr.)

Q. Looking at the photostatic copy which has been handed you, can you say whether or not that contains a correct transcript of your said article?

A. It does.

By Mr. GATES.—There is introduced in evidence as Defendant's Exhibit 71 the photostatic copy of pages 579 and 580 of the "Engineering News" dated November 25, 1909, Vol. 62, No. 22.

By Mr. COX.—The exhibit is objected to as incompetent and not the best evidence of the date or the contents of said article, or of any facts stated therein, and further for the reason that the said article purports to have been published more than two years and ten months after the application for the patent in suit. It is further objected to as being a mere *ex parte* statement concerning certain "experiments" made in 1909 containing largely expressions of opinion.

Q. Did you and Mr. Buzzell actually make experiments in 1909 with a device for conveying concrete through pipes under air pressure? A. Yes.

Q. Are the photographs on page 579 of the "Engineering News" article true and correct photographs? [458]

A. Yes, of certain parts of the various types of apparatus which were experimented with.

Q. Do they correctly represent what they purport to represent?

A. They do, understanding that more than one type of apparatus was exerimented with at that time.

(Deposition of William H. Larkin, Jr.)

Q. That is, these pictures do not show all the apparatus you used in your experiments?

A. They do not.

Q. But they do correctly show that part of the apparatus which they purport to show.

A. Yes.

Q. That is, they show correctly part of the apparatus actually used in those experiments?

A. They do.

Q. Will you examine these photographs shown on page 579 (Defendant's Exhibit 71) and state what they represent.

A. Fig. 1 shows one of several hoppers which were tried at different times and used to receive mixed concrete. Fig. 2 shows a stream of concrete leaving the end of the conveyor pipe, which leads from the receiving hopper or tank. Fig. 3 shows an experimental nozzle used at the point of exit of the concrete.

Q. Is the apparatus described in that article and shown in the pictures that you have just testified about, the apparatus of the patents to Buzzell and Larkin Nos. 894,813 and 951,754?

A. Yes, with two exceptions.

Q. What are those exceptions?

A. This machine described in the "Engineering News" article [459] had no syphon and it did have a conical deflector which was placed in the receiving tank or hopper in the endeavor to eliminate arching of the concrete at that point.

(Deposition of William H. Larkin, Jr.)

Q. What air pressure was used? You may refresh your recollection, with anything which does in fact refresh it.

A. Air pressure up to 100 pounds gauge pressure per square inch, but it was found that fifty pounds pressure was the most efficient in this particular case.

Q. How far was the concrete thrown?

A. With this particular apparatus the concrete was conveyed about 400 feet through a four-inch steel pipe.

Q. What was the amount of the charge or quantity of concrete placed in the gun?

A. About ½ cubic yard.

Q. How long did it take the gun to discharge that quantity?

A. When there was no arching in the receiving hopper or plugging in the line it took about five seconds. This however occurred only under favorable circumstances as we encountered great difficulty from the faults mentioned, and in fact the whole study and experimental work at Newark was carried on with the sole idea of finding a way to eliminate arching in the drum and stoppage in the conveyor pipe.

Q. Is this fact of arching in the drum and stoppage in the pipe-lines mentioned in your article in the "Engineering News"?

A. No, naturally.

Q. Did the concrete come out as shown in the

(Deposition of William H. Larkin, Jr.)

photograph entitled Fig. 2 in a solid stream or did it issue in [460] slugs or pistons.

A. A certain number of times when conditions were favorable there was a continuous unbroken discharge of concrete until all the batch had been shot out of the end of the pipe. Whenever the machine operated it discharged the whole mass at one time, and no attempt was ever made to discharge the material in any other way. There were very many trials made at which failure resulted from arching or plugging.

Q. (Continued.) In the whole history of this particular type of apparatus the difficulties mentioned were never eliminated and no attempt was ever made to move the concrete except in a continuous mass, discharging a complete batch at one time.

Q. Did the concrete ever come out in slugs or pistons? A. Never.

Q. Did you use air pressure on top of the concrete only in the gun or did you also use a supplemental jet?

A. We never at any time used any method other than that of applying air pressure at the top of the mass of concrete in the receiving hopper or drum.

Q. Just what did these steps shown and described in the "Engineering News" article of November 1909 (Defendant's Exhibit 71) prove to your mind?

A. They proved that the apparatus as designed and patented was not reliable enough to be a com-

(Deposition of William H. Larkin, Jr.)

mercial article at that time. The experiments also proved to us that considerable further work had to be done to determine the basic method for discharging the concrete from the receiving hopper positively and without danger [461] of interrupting from arching and plugging. And it was on this line that considerable engineering work of this character and experimental studies were made by Buzzell and Larkin subsequently.

Q. Did not the results of these tests, however, convince you that it was practicable to convey concrete by compressed air?

A. These experiments at Newark left us hopeful that this end might be attained but convinced us that we were not at that time on the right track.

Q. What was there about this apparatus that left you hopeful that this end might be attained?

A. We were encouraged by the fact that we did discharge a certain number of batches in a continuous mass successfully. Although we redesigned and rebuilt the hopper several times, and tried numerous shapes and types of deflector *comes* in the hopper, and various mixtures and consistencies of concrete, we never at any time had the apparatus work certainly enough so that we felt that it was a commercial machine and had a chance to bring us in a return for the considerable expenditure running into thousands of dollars which we laid out on the experiments. In conclusion, we hoped that further experiment would be carried on but with some-

(Deposition of William H. Larkin, Jr.)

one backing other than ourselves and with someone else's money.

Q. Referring now to Defendant's Exhibit No. 70, which is the photostat of your sketch dated October 14, 1910, will you state in a very general way if there is any relation between that sketch and Bernoulli's Theorem referred to on page 580 of "Engineering News," for [462] November 25, 1909, being second page of Defendant's Exhibit 71.

A. These sketches show the method by which we applied Bernoulli's Theorem in the calculation of pipe-line friction and resistance so that the necessary pneumatic pressure for use on top of the mass of concrete in the receiving tank could be determined. We also determined by this method the amount of free air capacity required and the necessary mechanical horse-power to move the mass through the length of pipe.

Q. Did you and Mr. Buzzell ever assign your patents 894,813 and 951,754? A. Yes.

Q. To whom?

A. These patents were assigned to the Pneumatic Concrete Conveyor Company of New York.

Q. When? A. The 11th of April, 1910.

Q. Was this assignment recorded in the Patent Office? A. It was to the best of my belief.

Q. Would you recognize a photostatic copy of the same?

A. I should from the signatures and from the name of the attorney who made the assignment, Lewis E. Knox.

(Deposition of William H. Larkin, Jr.)

Q. I hand you a photostatic copy of an assignment purporting to be signed by you and Mr. Buzzell and assigning these two patents and I ask you if that is a copy of the assignment you have just testified about. A. It is.

Q. Is that Pneumatic Concrete Conveyor Company, the assignee, still in existence? [463]

A. It is.

Q. What business has it?

A. Solely the business of collecting royalties from its licensees.

By Mr. GATES.—There is introduced in evidence as Defendant's Exhibit 72 a photostatic copy of an assignment of patents No. 894,813 and No. 951,754 from J. William Buzzell and William H. Larkin, Jr., to the Pneumatic Concrete Conveyor Company, dated April 11, 1910.

Q. Are you connected with the Pneumatic Concrete Conveyor Company and if so in what capacity?

A. I am, being a stockholder, a member of the Board of Directors, and Treasurer of the company.

Q. What are the reasons for the continued existence of this company?

A. For the purpose of collecting royalties from licensees and negotiating for sale of the patents.

Q. You have mentioned licensees under these patents. Will you please state what licenses have been granted under these patents by the Pneumatic Concrete Conveyor Company.

(Deposition of William H. Larkin, Jr.)

A. About 1910 a license was granted and afterwards allowed to lapse, to the Ransome Company of Dunellen, New Jersey. About 1912 a license was granted which shortly afterwards was allowed to lapse to the Pneumatic Placing Company of 2 Rector Street, New York. At a considerable later period, probably about 1920, a license was granted to the Concrete Mixing & Conveying Company of Chicago. Those are the only licenses granted as far as my personal recollection goes.

Q. Is the Concrete Mixing & Conveying Company which you have just referred to the plaintiff in this action? [464] A. It is.

Q. What was the consideration for the license given them?

A. The consideration given was a certain amount of stock in the Concrete Mixing & Conveying Company.

Q. How much stock?

A. They paid for this license 83⅓ shares of about ⅙ of their outstanding stock issue.

Q. Does the Pneumatic Concrete Conveyor Company still own any stock in the plaintiff in this action? A. It does.

Q. How many shares.

A. About 58 shares at the present time.

Q. What has been done with the stock represented by the difference between 82⅓ shares which you at one time held and the 58 shares which you now own?

(Deposition of William H. Larkin, Jr.)

A. They had use for some shares of stock which we took advantage of and sold them back part of our holding.

Q. When you say "they" to whom do you refer?

A. The Concrete Mixing & Conveying Company of Chicago.

Q. How much did you receive per share of stock on this sale? A. We received $100 per share.

Q. In cash? A. In cash.

By Mr. COX.—This entire line of examination relating to the details of the stock of the witness' corporation in the plaintiff corporations is objected to as wholly irrelevant to the issue in this suit, and entirely improper.

Q. What is the amount of the capital stock of the Pneumatic Concrete Conveyor Company?

By Mr. COX.—Same objection. [465]

A. There were 100 shares of common stock issued. That is all.

Q. How much stock do you own ?

By Mr. COX.—Same objection.

A. I own 50 shares.

Q. Is Mr. Buzzell a stockholder?

By Mr. COX.—Same objection.

A. Mr. Buzzell owns 49 shares.

Q. Do you recollect when it was that you sold some of your stock in the Concrete Mixing & Conveying Company back to that company?

By Mr. COX.—Same objection.

A. It was during the latter part of 1925 or early in 1926.

(Deposition of William H. Larkin, Jr.)

Q. What dividends if any has the Pneumatic Concrete Conveying Company received on its stock or shares in the Concrete Mixing & Conveying Company?

A. It has never received any dividends.

Q. What do you know of the financial condition of the plaintiff company?

By Mr. COX.—Same objection.

A. Very little as Mr. Buzzell has handled that phase of the matter from the start.

Q. What is that little that you do know?

By Mr. COX.—Same objection.

A. I know that the company is burdened with a heavy deficit and that any and all money they have received from royalties has gone into the continuous litigation that has been under way since their organization, which is also practically true in the case of Pneumatic Conveyor Company. [466]

By Mr. COX.—The answer is further objected to as hearsay in view of the statement of witness of his lack of actual knowledge.

Q. As treasurer of the company holding stock in Concrete Mixing & Conveying Company have you ever seen or received any of its annual reports?

By Mr. COX.—Same objection and protest is hereby made to this wholly irrelevant and improper examination relating to private affairs of a witness and his corporation and the plaintiff corporation. Defendant's counsel is requested to confine himself to relevant questions and close this examination.

A. Such reports if any have been sent to Mr.

(Deposition of William H. Larkin, Jr.)

Buzzell, president of the Pneumatic Concrete Conveyor Company at his residence in East Orange. I believe that I have been sent copies occasionally but I have no recollection of any particular report or its contents.

Q. Can you say when you received the last one of these copies?

By Mr. COX.—Same objection and it is consented by defendant's counsel that this objection be regarded as standing as to this line of examination.

A. To my recollection an annual report came through during the early part of this year which formed the basis of my impression that they were not in very good shape and that they were laboring under a considerable deficit.

Q. As treasurer of the company holding stock in the plaintiff company can you state what are some of the sources of income of the plaintiff. [467]

A. To the best of my belief their only source of income are from royalties received and the occasion sale of a small block of stock.

Q. From whom does the plaintiff receive royalties?

A. Plaintiff has received royalties solely from its licensees.

Q. And who are they?

A. Their licensees are mainly contractors on tunnel work.

Q. Do you know the Ransome Concrete Machinery Company of New York? A. I do.

(Deposition of William H. Larkin, Jr.)

Q. What business is it in?

A. The manufacture and sale of concrete mixing conveying and placing machinery, together with the manufacture and sale also of a considerable line of accessories.

Q. Is the Ransome Company a licensee of the plaintiff under its letters patent for conveying concrete?

A. The Ransome Company has certain patents of its own in this field. They and the Concrete Mixing & Conveying Company have a mutual agreement by which they share the use of each other's patents and a certain arrangement of the profits. The exact facts of which I do not recollect.

By Mr. COX.—Answer objected to as incompetent and obviously based on hearsay.

Q. As the treasurer of a corporation holding stock in the plaintiff corporation, do *you what* royalties or sums of money the Ransome Company are paying, have been paying, or have paid the plaintiff?

A. There have been some payments, the exact amounts or time [468] of which I have no definite knowledge.

Q. You stated that some time ago, that is in the early part of this year, you received an annual report of the plaintiff company. Do you recollect what that report showed as to the amount of income received by the plaintiff during the period covered by the report, approximately?

A. I do not.

(Deposition of William H. Larkin, Jr.)

Q. What were the reasons inducing the Pneumatic Concrete Conveyor Company to grant a license to the plaintiff in 1920.

A. The reason was largely based on the history of the apparatus as a whole. Directors of Pneumatic Conveyor Company of New York felt that they could capitalize what value there was in the patent by consolidating with a going concern which was the owner of the only successful method for conveying concrete as now practiced, namely the McMichael method.

Q. Is that license about which you have just testified in writing? A. It is.

Q. Is it recorded in the Patent Office?

A. I do not know.

Q. Did the license guarantee any minimum royalty? A. No.

Q. Were you and your company Pneumatic Concrete Conveyor Company intimidated into giving a license to the plaintiff or did the plaintiff voluntarily seek a license from you?

A. No. On the contrary we were for some time previously [469] trying to interest them in our company as we believed that a consolidation would be highly desirable for us, considering the fact that they were a going concern.

Q. Did the plaintiff ever threaten your company with suit? A. Never at any time.

Q. What reasons were given by the plaintiff for taking a license under the patents to Messrs. Buzzell and Larkin?

(Deposition of William H. Larkin, Jr.)

By Mr. COX.—It is understood that the standing objection applies to all of the foregoing questions since consent to the objection standing was last noted, and also to further questions along this line.

By Mr. GATES.—I so understood the situation.

A. The plaintiff company believed that it would be to their advantage to consolidate all the patents in this field and particularly the Buzzell-Larkin patents, not so much because of their value as patents but because of the advertising that they had received and because of the fact that both Buzzell and Larkin had been long known in the engineering field.

Q. I understand that the plaintiff is still operating under this license from the Pneumatic Conveyor Company.

A. They have never operated under the license of Pneumatic Conveyor Company but have confined their entire efforts to the development of the McMichael patent and method.

Q. Is the license from the Pneumatic Concrete Conveyor Company to the plaintiff still in effect?

A. It is.

Q. What is there in the Buzzell and Larkin patent that you think is an improvement over the McMichael patent?

A. Nothing. On the contrary we have admitted consistently [470] that the Larkin and Buzzell patent is unworkable in its present state of development and that the McMichael patent and method is

(Deposition of William H. Larkin, Jr.)

the only means to-day by which concrete can be conveyed through pipes.

Q. And was this your opinion at the time you gave the license to the plaintiff? A. It was.

Q. If that was your opinion at the time you made the license, did you have no compunction or conscience in selling it or taking money for it from the plaintiff?

A. At the time the license was granted to the Concrete Mixing & Conveying Company we believed that the years of development work that we had performed and the history of our experiments were of more than a little value to that company. The Concrete Mixing & Conveying Company on its part was entirely conversant with the history of the Pneumatic Concrete Conveyor Company's apparatus and method. They were more than pleased to absorb the company in the way they did for the sake of the advertising value of the older concern and to obtain the association, engineering advice and assistance of Messrs. Buzzell and Larkin.

Q. Is the plaintiff company a going concern?

A. It is.

Q. You have mentioned previously certain licenses given by the Pneumatic Concrete Conveyor Company to certain persons or firms other than the plaintiff in this suit. Will you please state what the consideration was for these licenses.

A. As a consideration for these licenses the licensees [471] were to pay the Pneumatic Con-

(Deposition of William H. Larkin, Jr.)

crete Conveyor Company certain royalties based on a price per cubic yard for concrete placed.

Q. Do you remember what that figure was?

A. No, I do not.

Q. What were some of the jobs done under these previous licenses?

By Mr. COX.—Objected to as wholly irrelevant unless it is limited to work done under the Buzzell and Larkin patents and not by infringing the McMichael patent.

A. No work was ever done under these previous licenses.

Q. Did you ever receive any money from these previous licenses by way of royalty or otherwise?

A. None whatever to the best of my belief.

Q. What value had these Buzzell and Larkin patents 894,813 and 951,754 at the time when the license was granted by the Pneumatic Concrete Conveyor Company, to the Concrete Mixing & Conveying Company, if any?

A. It was understood at the time that no value resided in the patents themselves but that the engineering experience of Buzzell and Larkin in this field was an asset.

Q. Did you consider that the Buzzell and Larkin patents had only a nuisance value.

A. No, except it was the policy of the Chicago Company to control any and all existing patents in the field.

(Deposition of William H. Larkin, Jr.)

Q. Your sympathies, Mr. Larkin, are entirely with the plaintiff in this litigation are they not?

A. Why practically it could not be otherwise because if the plaintiff loses we personally lose. [472]

Q. As a matter of fact you have discussed your testimony given in this case and also given in your prior deposition in the cases brought by this same plaintiff against Stone & Webster and the Great Western Power Company have you not with plaintiff's counsel.

A. I never have at any length. Some very brief remarks have been passed back and forth in the few minutes just previous to taking my deposition.

Q. On what points were these remarks that you have just referred to?

By Mr. COX.—Objected to as wholly improper and an attempt to cross-examine defendant's witness who has shown the utmost fairness and frankness throughout.

A. The only ideas exchanged were a very brief discussion as to the advisability of allowing in any testimony with regard to financial matters, and largely based on the thought that we are not very proud of the record in that respect.

Q. What points did you discuss in your previous deposition taken at Millville in the Stone & Webster and Great Western case?

A. There was no discussion whatever with the exception of a very brief conversation, not lasting over ten minutes with regard to the differences be-

(Deposition of William H. Larkin, Jr.)

tween the McMichael method and the Larkin-Buzzell method of conveying concrete.

Q. Have you followed the advice of plaintiff's counsel in regard to the character of your testimony?

A. I have not; neither have I been requested to take any particular line of testimony. [473]

There is introduced in evidence as Defendant's Exhibit 73 the photostatic copy of the witness Larkin's affidavit dated August 30, 1909, the original of which was filed in the Patent Office, and an exhibit 73A the affidavit of the witness dated January 12, 1910, the original of which was also filed in the Patent Office. These exhibits have previously been used and referred to by the witness and have been marked for identification.

By Mr. COX.—Objected to on the same ground as the questions relating to their verity put to the witness and as wholly incompetent, irrelevant and immaterial, and attention is called to the fact that these affidavits are dated long subsequent to the application for the patent in suit.

(Direct examination closed.)

Cross-examination.

(By Mr. COX.)

Without waiving any of the objections.

Q. As I understand it these sketches marked exhibits 70 and 70a are photostats of sketches made by you from memory some time subsequent to January, 1907, and probably in 1909 about the time you made

(Deposition of William H. Larkin, Jr.)

the affidavit of August 30, 1909, marked Exhibit 73, is that correct? A. It is.

Q. Have you any way of fixing the date of the sketch exhibit 70a which bears the date "December 1906" and Exhibit "B" than memory? I mean the date of the original which this sketch purports to reproduce as [474] distinguished from other sketches made by you in the period of several months following December 1, 1906.

A. I have no definite way to fix the exact date. My diary shows that in 1906 I was work manager for the United Concrete Machinery Company and actively engaged in this field. It was shortly after that this particular company went out of business, and I went to Laporte, Indiana.

Q. During the period between December 1, 1906, and the filing of your patent application in June, 1907, you made various sketches of apparatus of this general character did you not? A. I did.

Q. As I understand it, the experiments described in the "Engineering News" article of 1909 represented by exhibit 71 did not result in the production of a practically useful device or method of conveying concrete pneumatically. Is that correct?

A. That is correct.

Q. Did these experiments or any other experiments made by you teach how to overcome arching in the vessel or plugging at the pipe?

A. They did not.

Q. Do you understand the apparatus of the McMichael patent in suit and its operations?

(Deposition of William H. Larkin, Jr.)

A. I do.

Q. Does that patent teach a method of preventing this arching and plugging of the concrete?

A. It does.

Q. Did you ever prior to the grant of your two patents [475] referred to in your direct testimony employ a device for conveying concrete pneumatically in which there was pressure behind the mass of concrete in the chamber and a jet or nozzle at or near the outlet of the chamber for directing compressed air into a portion or behind portions of the mass near the outlet?

A. Never at any time.

Q. Did defendant's counsel here present know of your interest in the plaintiff company through your company, the Pneumatic Concrete Conveyor Company before he called you as a witness in this case?

A. I have no definite knowledge. Probably not.

Q. I mean, did he, before he put you on the stand as a witness, know of that interest?

A. That is correct because of conversations we had previous to taking of depositions in which I explained that connection to him.

Q. Is any license granted by the Pneumatic Concrete Conveyor Company under the Buzzell and Larkin patents except that held by the plaintiff now in force, and if not how long since any such license has been in force?

A. There are none at the present time and it is

(Deposition of William H. Larkin, Jr.)
about fourteen years since any previous license has been in force.

Q. Have you received from the plaintiff company or has your Pneumatic Concrete Conveyor Company received from it any royalties or other payments or compensations than the stock mentioned by on direct examination for the license under the Buzzell and Larkin patents? [476] A. No.

Q. Is there any agreement providing for such royalties or other compensations?

A. None other than that the New York Company is to participate in any dividends paid out by the Chicago Company.

Q. Do you not know that any expenses of the Concrete Mixing & Conveying Company, the plaintiff, over and above receipts are taken care of by stockholders of that corporation? A. Yes, I do.

Q. Do you know whether the Ransome Concrete Machinery Company receives anything from the plaintiff company except payments in the nature of partial compensation for business lost by that company on account of the infringement of the patent in suit by others while the Ransome Company is paying royalties for the use of the patent?

By Mr. GATES.—I suppose, of course, that the witness will testify as of his direct knowledge and not from hearsay in answer to this question.

A. I cannot answer that question from my own knowledge.

Q. Then I understand you do not know what the nature or reason may be for any compensation re-

(Deposition of William H. Larkin, Jr.)

ceived by the Ransome Company from the plaintiff?

By Mr. GATES.—I object to the form of this question because it assumes that the witness has testified that he knows that compensation has been in fact received by the Ransome Company. He has just testified that he does not know of his own knowledge either that the Ransome is receiving any money from the plaintiff or [477] any reason why they should so receive.

A. The answer is stated in previous testimony. My recollection has been that money *has* received by the Chicago Company from the Ransome Company, but I have no knowledge of any money, or any reason for money having been paid by the Chicago Company to the Ransome Company.

Q. The sketches marked Exhibit 70a Exhibit "B" show a small pipe running to the conveyor pipe and connected with the upper part of the pressure tank. Is that the same pipe shown in the little sketch at the right-hand upper corner of the top sheet and marked "Detail of syphon." A. It is.

Q. Was that pipe intended to be used to produce a syphon?

A. The object of the pipe was to introduce a jet of steam at that point, which first expanding and then condensing would tend to produce a partial vacuum which, it was hoped, would assist operation of conveying and possibly tend to eliminate arch-

(Deposition of William H. Larkin, Jr.)

ing. This syphon pipe was never actually used by us at any time.

Q. Would it have served any useful purpose if used with compressed air and water.

A. It would have been a detriment if compressed air were used for the reason that it would have put back pressure on the conveyor line at an undesirable point; moreover there would have been no condensation and production of partial vacuum which was the primary idea of the appliance.

Q. Could it have prevented arching or plugging? [478]

A. No, our experience led us to believe that it would have tended to promote arching and plugging and for that reason we did not use it.

Q. Then did you abandon the idea of using this prior to the granting of the patents to you and Buzzell? A. We did.

Q. Referring to this sketch of Exhibit 70a please point out where the arching of the concrete usually occurred in the vessel or chamber.

A. The arching almost invariably occurs at a point where the conical part of the chamber joins the cylindrical part.

Q. Just what is this arching that you refer to?

A. When the pressure is applied to the top of the mass in the receptacle there is a tendency for the *air push* the liquid portion of the concrete down through the solid stone, leaving it high and dry in

(Deposition of William H. Larkin, Jr.)

the form of an arch in the upper part of the chamber.

Q. Where did the plugging of the pipe occur?

A. The plugging of the pipe occurred at no particular point in the conveyor line but was liable to take place anywhere in its length.

Q. Did it occur between the outlet at the conical bottom of the tank and the horizontal portion of the pipe? A. Yes, it did at times.

Q. Does Fig. 4 of the Buzzell and Larkin patent No. 894,813 illustrate your plan for preventing plugging of the conveyor pipe by means of syphons like that shown at "I" in exhibit 70a, the sketches marked Exhibit "B"? A. It does.

(Cross-examination closed.) [479]

Redirect Examination.

(By Mr. GATES.)

Mr. Larkin, the testimony with respect to exhibit 70a, that is the drawing dated December, 1906, has been somewhat contradictory and to my mind a little confusing and I should like to probe your recollection a little further with respect to this matter.

Q. In your affidavit of August 30, 1909, you say that you made certain sketches on or about October 14, 1904, and in December, 1906, and you further say "said original sketches I am retaining in my possession for future use in possible litigation or interference." In answer to a direct question you stated that this reference to original sketches in the affi-

(Deposition of William H. Larkin, Jr.)

davit meant the original sketches themselves and not copies. I ask you to read that exhibit No. 73 and see if there is anything there to indicate that you were filing with the Patent Office in a matter of some importance not blue-prints of original sketches which you had in your possession but blue-prints of copy made from memory some time after the original sketches were made. Do you find any such indication in that affidavit?

By Mr. COX.—Objected to as an attempt to contradict the testimony of this witness given on direct in answer to questions by defendant's counsel, and also as assuming facts not warranted by the records, and attention is called to the statement on the sketch Exhibit "B" that it is a "copy of data furnished J. W. B. for patent appl. Dec. 1906.."

By Mr. GATES.—Attention is called to the obvious and improper attempt to coach the witness in advance of his [480] answer by calling his attention to a paper which is not referred to in the question and which the present examiner would have brought out in its proper order. No attempt is being made to contradict the witness, but an attempt is being made to clear up some little confusion in the direct testimony which has been enhanced by the cross-examination. I'll repeat the question.

By Mr. COX.—I deny any attempt whatsoever to lead the witness, but insist upon defendant's counsel refraining from misleading him. The affidavit refers to the sketch and must be considered with the sketch.

(Deposition of William H. Larkin, Jr.)

Q. I withdraw and reframe the question. Is there anything in that affidavit of August 30, 1909, as distinguished from the sketches attached thereto which would indicate that in a matter of some importance you were filing with the Patent Office blue-prints not of original sketches but of copies of those sketches made some time subsequent to the date of the original sketches themselves.

A. Stretching my memory back twenty years it seems to me that the explanation is as follows: Examining the sketches which state that they are copies of previously made drawings or sketches indicate that at the time of my making the affidavit that the original sketches were no longer in my possession. Reading the affidavit seems to develop a little ambiguity in the use of words. Where in the last line of the first page I stated that I am retaining the original sketches in my possession, I probably intended to convey that I was retaining the originals of the blue-prints which I made at some [481] period subsequently and which were in the form of freehand drawings on tracing cloth made from my memory of the original sketches made in 1904 and 1906. I believe that the whole confusion turns on the words "original sketches" in the last line, which probably should have read "original tracings from which the blue-prints mentioned in the affidavit were made."

Q. Bearing in mind that all I'm attempting to do by these questions is to bring out the real facts of the matter by assisting you perhaps in recollecting

(Deposition of William H. Larkin, Jr.)

events which you have several times said happened many years ago, take exhibit 70 and point out what words on that exhibit indicate to you that those sketches are copies made in 1909 and not originals, made in 1904.

A. On exhibit 70 it gives my letter-head at La-Porte, Indiana, to which are attached these two sketches or photostats. On this letter-head is the signature of W. E. Higgins who drew up the affidavit, who was a lawyer in LaPorte, and whom I knew at that time, all of which indicates that the material was assembled in 1909 at the time the affidavit was made. On the photostat are the words "Copy of sketch and calculations made by W. H. L. Jr. at Boston, Mass., October 14, 1904" which certainly indicates that they are copies and not originals. Again it is evident from examination of the photostat that these are tracings as the dark edge of the blue-print where it overlapped the tracing shows, as is quite common in such cases. All of which seems to check my memory that for purposes of the affidavit in consideration I made some sketches from memory in an [482] attempt to reproduce the data which was contained by other sketches made some years previously.

Q. Perhaps there has been some ambiguity occasioned in this whole matter by the use of the word "originals" and "copies." I do not particularly care whether the drawings and calculations of which these exhibits are blue-prints were in themselves originals or traced copies as the witness has sug-

(Deposition of William H. Larkin, Jr.)

gested. I only want to know when these copies were made. I ask you again, Mr. Larkin, what do you find either in the affidavit exhibit 73 or in the photostat exhibit 70 that indicates to you that those drawings and sketches, whether originals or copies on tracing paper, were actually made, not in 1904, but in 1909. I mean what is there that indicates to you that those sketches of which exhibit 70 is a blue-print were actually made not in 1904 but in 1909.

A. There is absolutely nothing on those sketches shown in the photostat which proves exactly when they were made. However, my recollection of the matter is that most of the old drawings and calculations which were made at Boston, mostly in Gilbreth's office before his failure and suspension of business were destroyed when the office was closed and since I had nothing to do with the concrete machinery business until about 1909 when we began actively to experiment with the concrete conveyor, I feel sure that the sketches shown on the photostat were drawn by me free-hand on tracing cloth from my recollection of the old sketches made several years previously.

Q. In your cross-examination, Mr. Larkin, you stated that [483] during the period between December 1, 1906, and the filing of the Patent Office application in June, 1907, you made various sketches of apparatus of this general character. Do you now recall approximately how many sketches you made during this period.

(Deposition of William H. Larkin, Jr.)

A. No, I have no distinct recollection. Quite a number *of* of sketches were necessary in connection with the application and I had to make them.

Q. Can you now say whether or not these sketches differed substantially from one another and from the sketches made in 1906 in so far as they illustrated the joint invention of yourself and Mr. Buzzell.

A. All sketches that I made during this period had the general characteristic of the patent drawings. I am particularly sure of this because we never had at any time ideas except along this particular line and method.

Q. I understand you to say that from your diary you have been able to fix the dates of one of these sketches as December, 1906.

A. That is so. The way I fixed that date was with the assistance of my diary as 1906.

Q. And you now have no doubt that the tracing made in 1909 is substantially a correct copy of a sketch which you had made in December, 1906.

A. I have a distinct recollection that the free-hand drawing which I made on tracing cloth shown on the exhibit mentioned is a reasonably faithful reproduction of a sketch made during 1906.

Q. Am I right in understanding that you have searched for two things, (1) the original sketches made in 1904 [484] and 1906 and the free-hand reproductions of those drawings made from memory made in 1909, and that you have not been able to

(Deposition of William H. Larkin, Jr.)

find them and that to the best of your knowledge and belief both have been either lost or destroyed?

A. Yes, that is true.

(Deposition closed.) [485]

Mr. TOWNSEND.—With that, your Honor, the defendant rests.

The COURT.—Any rebuttal?

At this point a recess of ten minutes was taken to allow counsel and witnesses to inspect two large exhibits housed in the basement of the court building, after which the following occurred.

Mr. WILLIAMS.—If the Court please, in rebuttal on behalf of the plaintiff we offer the file-wrapper showing the prosecution of the application for the patent to Roy C. Hackley, No. 1,619,297 and ask that it be marked Plaintiff's Exhibit 27.

Mr. TOWNSEND.—Objected to, your Honor, as not rebuttal and as incompetent and irrelevant.

* * *

Mr. WILLIAMS.—If the Court please, we offer as exhibit 12–A the drawings of the Hackley application and description of those drawings as originally filed. The defendant has during its proofs offered in evidence the Hackley patents which issued. What I am offering now is the balance of the file-wrapper and if that shall take—

The COURT.—(Interrupting.) First I want this identified so that I will know it and know where to look for it. You say that it is in evidence, Mr. Clerk?

CLERK.—The plaintiff put it in as part of its exhibit 12, 12–A.

The COURT.—Why is it offered again. It is in.

Mr. WILLIAMS.—I just explained to your Honor that what we offered originally and what was marked 12 or 12–A was that part of the file-wrapper which included the drawings of the application as filed and a part of the specification, or in fact the whole of the specification as originally filed. What I am offering now is the balance of that batch of papers which I have referred to as the file-wrapper showing the prosecution and in answer to the objection of counsel [486] as to its materiality and irrelevancy I shall wish to argue and I offer these papers for the purpose of permitting me to argue that Hackley when he filed that application and when he described his machine, described it exactly in accordance with the mode of operation which we contend it to have. The patent which the defendant has put in evidence shows contains specification ten containing quite a different description.

I wish to show by this file-wrapper now that when this suit was filed Mr. Townsend, the attorney for Hackley, cancelled in its entirety the original specifications describing the thing as Hackley then swore it to be, and substituted a wholly new specification and description which it is quite evident was written with the idea of meeting the exigencies of this suit. I think for that purpose it is entirely material.

The COURT.—Even so, you do not introduce evidence simply to show a thing unless that in itself will have some bearing on the issues in the case.

Mr. WILLIAMS.—It seems to me that it has a very decided bearing upon the issues of the case to show that when there was not the reason of this suit they described the thing that Hackley described in the manner which we contend it was made and the way it operated, and that at the time this suit was filed and as a result, it seems to me it is a fair inference to assume that because of this suit the counsellor in this case modified that description and caused it to issue as the patent which the defendant has put in evidence with a description conformable with the defendant's theory in this case. [487]

Mr. TOWNSEND.—The only necessary answer, your Honor, is that the suit was filed first and the application was prosecuted in the usual way. Nothing of what counsel has said is—

The COURT.—(Interrupting.) I cannot see that it is material what they did to show they changed it because of this suit. Well, that does not mean anything in this case. The objection will be sustained.

Mr. WILLIAMS.—Exception, and I offer to prove the facts as I have stated them in arguing this objection.

The COURT.—I suppose the objection goes to that. Are you objecting to this offer or not?

Mr. TOWNSEND.—I entered an objection your Honor. We objected to the offer your Honor.

The COURT.—Sustained.

(Testimony of Arthur P. Robinson.)

Mr. WILLIAMS.—Exception.

Mr. WILLIAMS.—I would like to offer the balance of that file-wrapper marked for identification as Plaintiff's Exhibit No. 27.

The COURT.—(Interrupting.) Take a single series of numbers. We are way past 27. We are now in the hundreds.

The CLERK.—196 will be the next exhibit number.

Mr. WILLIAMS.—That is Plaintiff's Exhibit 196.

(Whereupon file-wrapper of Hackley patent offered as a whole, marked Plaintiff's Exhibit 196 and its admission denied.)

The COURT.—Proceed if you have anything further. [488]

TESTIMONY OF ARTHUR P. ROBINSON, FOR PLAINTIFF (RECALLED IN REBUTTAL).

ARTHUR P. ROBINSON, a witness previously called on behalf of the plaintiff, was recalled on behalf of the plaintiff in rebuttal.

Direct Examination.

(By Mr. WILLIAMS.)

He is the Arthur P. Robinson who had previously been sworn and who had testified in this case. He produced drawings and some description of drawings to illustrate the Canniff grouting machine as manufactured and sold by the Ransome Concrete

(Testimony of Arthur P. Robinson.)

Mixing Machinery Company, the typewriting being the regular instructions that go out with some of these machines. The blue-print illustrates the way the witness' company manufactures the Canniff grouting machines and sends them out. The lines shown halfway down the chamber represent a grid or grizzley to keep large stones—if any get into the sand—from dropping into the discharge. That grid is present to prevent them dropping in and closing up the discharge. The witness marks the grid or screen with the letter S in red on Plaintiff's Exhibit 197. The witness stated that he had examined the so-called Canniff machine in the basement of the building which in the record has been given exhibit No. 179, and that he had heard the testimony about the use of that Canniff machine for the pneumatic placement of concrete—the testimony of Mr. Peterson.

Q. Now, will you state whether or not this Defendant's Exhibit No. 179, said to represent the Canniff machine does represent the Canniff machine as manufactured and sold by the Ransome Concrete Mixing Company?

Mr. TOWNSEND.—Your Honor, we object to that.

Q. Or as shown in this blue-print?

Mr. TOWNSEND.—This machine has not been offered as a product of the Ransome Company. It was made back in 1908 or 1909 [489] and was obtained in New York and Mr. McCormick made

(Testimony of Arthur P. Robinson.)

no statement—I don't suppose, in fact, he knows what company built that, so it is not proper.

The COURT.—He may state whether it is the Canniff machine and point out the differences if he can.

A. The machine that I have just examined in the basement, it has the plug over on this side where we have the discharge—where we have the discharge there is a plug in there and evidently their discharge is where we have the plug. In other words, as rigged up, to me it looks like a McMichael machine instead of a Canniff machine.

Q. It has been re-arranged, has it, to conform with the disclosure of the McMichael patent?

Mr. TOWNSEND.—Objected to as leading and not conforming to the facts.

The COURT.—He may answer.

A. Its operations are like the McMichael machine. The way I understand that they have it piped up its operation is like the McMichael machine rather than the Canniff machine. In other words, they have the plug line where we have the discharge line and they have a discharge line in where we have a plug in.

Th COURT.—Well, does that mean that the blow is on one side of the machine in your case and on the other side in the other case?

The WITNESS.—May I explain it to you?

The COURT.—Yes.

A. Here is our discharge line here (indicating) and this is the plug up here (indicating). The plug

(Testimony of Arthur P. Robinson.)

down in the basement is over here (indicating) and the discharge is [490] over there (indicating).

The COURT.—Simply a reversal of the direction of the operation, is that all, or are there any other differences.

A. Reversal in the direction of the operation, yes, sir.

The COURT.—Proceed.

Q. Now, will you look at a copy of the Canniff patent, No. 873,345, which has been offered in evidence and state whether or not the Canniff machine as manufactured and sold by the Ransome Company and as shown in this blue-print, Plaintiff's Exhibit 197, corresponds in its arrangement with the disclosure of the Canniff patent?

A. I think I understood your question right. The machine in the blue-print that I have just submitted is essentially so far as I understand, in its operation this original Canniff drawing.

Q. That Canniff patent. You say "In its operation" but how about its structural arrangement, does it correspond or does it not correspond?

A. We use a different type of door—a different construction. We use this—this has a plate head and we have a cast head and some things like that.

Q. What I am interested in having you testify about is the place at which the jet of air is projected toward or into the material which is to be delivered from the machine—

A. (Interrupting.) The same.

(Testimony of Arthur P. Robinson.)

Q. Does the machine as manufactured by the Ransome Company and as shown on the blue-print, Plaintiff's Exhibit 197, correspond with the disclosure of the Canniff patent?

A. Yes, sir. [491]

Q. Does the Canniff machine, which was offered by the defendant, as Defendant's Exhibit 179, correspond in its arrangement of the piping—the air piping and the inlet of air with the disclosure of the Canniff patent? A. No, sir.

The COURT.—Where is the discharge on this?

The WITNESS.—The discharge is right there and here is the plug here (indicating).

The COURT.—Where does the air come in?

The WITNESS.—You close this valve here (indicating) I guess it is marked 'E'' there. Then you put your sand and your cement and your water in and then you open this. I can explain on this because it is clearer. You open this valve here and that bubbles the sand and water up there and mixes it. Then you close the door and then you have to close this relief valve and open this valve into the discharge line and turn on your air in the top and force it out.

The COURT.—What is the other pipe here?

A. That is the mixing or bubbling pipe. You put your sand and cement in there and you shut that door and of course close the release valve and then you close this door and put the pressure on.

The COURT.—What valve is that which you open?

(Testimony of Arthur P. Robinson.)

A. No. 3 on our blue-print.

The COURT.—You shoot it out when you close this door and put the pressure on?

A. You leave that crack there which opens this a little bit. Here is the complete construction that has been going on with our machines for years.

The COURT.—And you say that this machine down in the cellar is [492] how?

A. The machine down in the cellar—it looks a little bit more like this (indicating). There is a plug, like here, and it looks as if they shoot the discharge out of it, and that is exactly in accordance with the other type of machines.

Q. Now, reference has been made to a concrete placing machine, pneumatic placing machine put out by the Ransome Company prior to the date when it took a license under the McMichael patents in suit. A. Yes, sir.

Q. Have you some drawings or description illustrative of those machines? A. Yes, sir.

Q. You produce the drawing, do you?

A. Yes, sir.

Mr. WILLIAMS.—We offer that in evidence and ask that it be marked Plaintiff's Exhibit 198.

Mr. TOWNSEND.—May I see it?

The WITNESS.—Here is the instruction sheet that has gone with it for years.

Mr. WILLIAMS.—We offer the instruction sheet and ask that it be marked Plaintiff's Exhibit No. 199.

(Testimony of Arthur P. Robinson.)

(Whereupon blue-print of the Pneumatic Placing machine of the Ransome Company was admitted in evidence and instruction sheet accompanying same was admitted in evidence as Plaintiff's Exhibit 198 and 199 respectively.)

The COURT.—What is this, now?

Mr. WILLIAMS.—This is the pneumatic placing machine put out by the Ransome Company and named, as we shall show—what was it—

The WITNESS.—The Ransome Canniff. We called it the Ransome Canniff for a while, and we called it the Ransome [493] Pneumatic Mixer and Placer.

The COURT.—Proceed.

Q. Now, does this machine have its air jet arranged as disclosed in the Canniff patent or as disclosed in the McMichael patent?

A. As in the McMichael patent, directly opposite from the Canniff patent.

The COURT.—What is that?

The WITNESS.—As in the McMichael patent, directly opposite from the Canniff patent.

Mr. WILLIAMS.—That is all, Mr. Robinson.

The COURT.—Cross-examine.

Mr. TOWNSEND.—No cross-examination.

(Witness excused.) [494]

TESTIMONY OF R. C. OXENHAM, FOR PLAINTIFF (RECALLED IN REBUTTAL).

R. C. OXENHAM, a witness previously called on behalf of the plaintiff, was recalled in rebuttal.

Direct Examination.

(By Mr. WILLIAMS.)

The witness states that he is the Mr. Oxenham who previously was sworn and who testified in the case.

Q. When you observed the operation of the pneumatic placing apparatus in the Skagit River Tunnel and the operations there of the Hackley machine, did you observe whether the concrete forming materials were of a consistency such as that they stood in a pile with sloping sides or whether those materials would, of their own flow assume a level condition? A. Stood in a pile.

Mr. TOWNSEND.—I would object to that as not proper *sur*rebuttal. Requiring this witness to piece out what they should have done on direct, if it had any bearing, and particularly that this witness is not qualified. He has shown himself utterly disqualified to testify in regard to these matters and it is not proper *sur*rebuttal.

Mr. WILLIAMS.—The defendant called as witness to testify whether that concrete was, as he called it, wet concrete, and I think it is material.

The COURT.—I think as rebuttal it is competent. Evidence that ought to be produced in

(Testimony of Shirley Houghton.)

chief may still be used in rebuttal. The objection is overruled. [495]

Mr. TOWNSEND.—I have one suggestion more. They are attempting to contradict and rebut their own witness,—the practical man who ran this machine and who has said that the concrete in the Skagit Tunnel, the Hackley gun—came out in a soft flow.

The COURT.—Who is that?

Mr. TOWNSEND.—The workman—the foreman.

The COURT.—Well, they are not bound by the statement of one witness if they are so unfortunate as to have a conflict in their own evidence. If that is the case, the Court may not be able to determine which to believe and believe neither.

Mr. WILLIAMS.—That is all.

Mr. TOWNSEND.—No cross-examination. [496]

TESTIMONY OF SHIRLEY HOUGHTON, FOR PLAINTIFF (RECALLED IN REBUTTAL).

SHIRLEY HOUGHTON, a witness previously called on behalf of the plaintiff, was recalled in rebuttal.

Direct Examination.

(By Mr. WILLIAMS.)

Q. You are the Mr. Houghton who has been sworn and previously testified in this case, are you?

A. Yes, sir.

The COURT.—What is the name?

(Testimony of Shirley Houghton.)

The WITNESS.—Houghton.

Q. Will you state if you know whether the vertical type of McMichael machines are still in use, and if so, where and to what extent? A. Yes.

Mr. TOWNSEND.—That is irrelevant and immaterial and not proper *sur*rebuttal.

Mr. WILLIAMS.—The effort of the defendant was very clearly to show by several witnesses that these machines were unsuccessful and failures and the inference surely was that they were not in use.

The COURT.—He may answer. Overruled.

A. Yes. There are several of them in use as of the present date and have been for a period of ten years on the Southern Pacific Railroad at various locations and on the Union Pacific Railroad.

Q. You heard Mr. Peterson's testimony, did you?

A. I did.

Q. Will you state whether or not a McMichael machine furnished by the plaintiff or its agent was delivered to the Pacific Gas & Electric Company under a contract entered into in 1916 and used by it in construction work and in [497] the pneumatic placement of concrete in Placer County, California, following that date.

Mr. TOWNSEND.—Objected to as not proper rebuttal and as irrelevant and immaterial and as attempting now to get from this witness testimony which the Court ruled out.

The COURT.—What is the object?

Mr. WILLIAMS.—I wish to show that the Pacific Gas & Electric Company whose employees are

(Testimony of Shirley Houghton.)

here expressing their opinions on various matters of operation and so on, first used pneumatic placing machines in its work which were furnished by the plaintiffs and that the plaintiff furnished that apparatus; that that was—I think there will be no evidence certainly, to show that they ever used any such apparatus prior to this furnished by the plaintiff here.

The COURT.—I cannot see that it is at all material. Objection sustained.

Mr. WILLIAMS.—Exception.

Q. I will ask you also whether the Pacific Gas & Electric Company paid royalties for the use of a McMichael machine so furnished?

Mr. TOWNSEND.—Objected to.

Q. In or about 1916 for the pneumatic placement of concrete in Placer County, California?

Mr. TOWNSEND.—Same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Do you know whether subsequent to that date the plaintiff or its agent endeavored to lease to the Pacific Gas & [498] Electric Company McMichael machines for the pneumatic placement of concrete?

Mr. TOWNSEND.—Objected to as not rebuttal.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Let me ask you a further question, whether, since the use of the McMichael machine in the Placer County job—the Auburn Tunnel—in about

(Testimony of Shirley Houghton.)

1916 or '17 the Pacific Gas or Electric Company has used McMichael machines furnished by the plaintiff cr its agents in the pneumatic placement of concrete in construction work which it has since been interested in?

Mr. TOWNSEND.—Same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

The COURT.—Proceed.

Mr. WILLIAMS.—That is all.

The COURT.—Cross-examine.

Mr. TOWNSEND.—None.

The COURT.—Your next witness.

(Witness excused.)

Mr. WILLIAMS.—We will call Mr. Ray. [499]

TESTIMONY OF FREDERICK RAY, FOR PLAINTIFF (RECALLED IN REBUTTAL).

FREDERICK RAY, a witness previously called on behalf of the plaintiff, was recalled in rebuttal.

Direct Examination.

(By Mr. WILLIAMS.)

The witness testified that he is the Frederick Ray who had previously been sworn and testified in this case. He stated that he had heard all of the testimony of all of the defendant's witnesses as to the mode of operation of the McMichael apparatus, the apparatus of the patent in suit.

(Testimony of Frederick Ray.)

Q. I wish, Mr. Ray, that you would state first whether you have made an investigation and observation record—whether you made an investigation and observations, anything that would determine the facts as to the mode of operation of this apparatus in so far, particularly, as the slug formation of the segmental delivery of the concrete materials is concerned.

Mr. TOWNSEND.—We object to that as not proper rebuttal. This witness was on the stand and testified directly on this matter. They are trying now to rehash and reconstruct their primary case and it will leave us at a decided disadvantage. We have answered all that they have set up now, and now they bring this in.

The COURT.—As a rule the plaintiff generally puts in the patent and some evidence of infringement, and that is all, and then the defendant attacks the process of patent and then in rebuttal the plaintiff tells about the process of his patent. Overruled.

The witness stated that he had observed quite a number of the McMichael machines in operation and determined their mode [500] of operation as well as he could by general observation of the discharge and hearing slugs passing through and observing pressure gauges in certain places. These particular machines were in ordinary commercial operation. That in order to determine the matter more scientifically, if possible, he had set up a small McMichael machine in Chicago last spring

(Testimony of Frederick Ray.)

and had attached to it certain recording gauges and also a special impact recorder so as, if possible, to determine the impact of these slugs passing through the pipe. This apparatus was operated for a number of days and numerous tests made of the various conditions of which he has records, and to his mind these tests demonstrated fully the opinion which he had previously formed from the operation of these commercial machines as to the mode of operation and the action that took place in conveying the concrete through the pipes.

Q. Now, would you describe quite fully the apparatus which you employed in making these scientific determinations as you have said?

Mr. TOWNSEND.—It is understood, your Honor, that our same objection goes to all this?

The COURT.—It may.

Mr. TOWNSEND.—And we will also object that these experiments that he made were utterly *ex parte* without notice to the defendant or its counsel.

The COURT.—Well, the Court will bear that in mind.

The gun used for these experiments was of the usual McMichael type, that is, similar to that shown in the patent in suit, and it was erected in a vacant shop and he had a photograph which illustrated this particular machine as it was erected in the place, which photograph was then introduced [501] as Plaintiff's Exhibit 200, over objection of defendant.

(Testimony of Frederick Ray.)

The witness then produced a second photograph showing a little more clearly the various valves on this machine which was then introduced as Plaintiff's Exhibit 201. The witness then produced a third photograph which shows the line leading from the machines and the connection of one of the recording gauges to the pipe-line. This photograph was offered as Plaintiff's Exhibit 202. The witness stated that the photographs show the general arrangement which consisted merely in the concrete conveyor or the gun being set up on the floor of this job and a horizontal pipe of 60 or so feet in length being carried over to a wooden box in which the mixture was discharged with one recording gauge connected to the chamber of the conveyor above the concrete mixture, which the witness called in these tests, "Gauge No. 1." The next gauge was connected to the top of the discharge pipe, something like 15 or 18 feet from the chamber. This gauge he called "Gauge No. 2." The third gauge was connected about 2 feet from the end of the discharge pipe and this he called "Gauge No. 3." These gauges were the ordinary type of Bristol recording gauges except that they were arranged to have a rapid rotation of the chart but even as furnished he found that the rotation of the chart was not rapid enough so he removed the escapement of the ordinary clock movement which rotates the chart so that they rotated freely under the action of the spring which increased their rate of rotation very materially. He produced a photograph

(Testimony of Frederick Ray.)

which simply shows these three gauges grouped together and the impact recording device for them. This photograph shows the general type of these gauges. It was then offered in evidence as Plaintiff's Exhibit 203. One of these gauges having a special time recording mechanism attached to it was introduced as Plaintiff's Exhibit 204. [502]

The witness stated that in using these gauges and the impact recording devices he desired to have an exact record of the time during which the test was going on so he had a pendulum which beat half seconds and which controlled the electric circuit in series and in this circuit there was placed the mechanism for placing the little mark upon the chart of the impact recording gauge and upon two of the pressure recording gauges, which gauges are numbers two and three.

(Whereupon timing mechanism was admitted in evidence as Plaintiff's Exhibit 205.)

The witness then stated that by the use of this timing mechanism there was marked upon each of the charts half second marks at the same time that the other indications were being recorded. These half second marks were made simultaneously on all except the chart on gauge No. 1, which was the chart that was attached to the top of the chamber.

The COURT.—What does all this lead to? You are going into a great deal of detail about these gauges.

The witness stated that it leads to the records which we produced by these gauges, which show

(Testimony of Frederick Ray.)

the pressure impulses passing through the pipe-line and which show the impact of the slugs as they left the pipe-line, clearly indicating to the mind of the witness that the concrete was conveyed through the pipe-line in the form of definite slugs. The witness produced five graphs. These were drawn up from the original gauge readings of these gauges. He reproduced those readings upon a single sheet in each case so that the relative locations of the variations of the pressure can be determined. On the bottom are placed numerals of the time in seconds from the beginning of the observations. The lowermost curve shows the pressure variation [503] in the chamber above the concrete.

The next curve, which is marked "Pressure Gauge No. 2," shows the variation in the pressure at the top of the pipe-line about 15 feet from the discharge of the chamber. The graph marked "Pressure Gauge No. 3" shows the pressure variations in the pipe-line about two feet from the end. The top line, which is marked "Impact recorder," shows the records of this impact recorder—that is, each one of these little marks represents the impact of a slug and is recorded upon the paper chart and which have been transferred to these charts. There are five of these sheets. They represent five different tests or five different discharges and they vary somewhat. No two charges go out of the gun in exactly the same manner but in the same general manner they will have the same characteristics—the details are different. Whereupon the charts marked by the

(Testimony of Frederick Ray.)

witness were offered collectively as Plaintiff's Exhibit 206.

Mr. TOWNSEND.—In addition to the objections already made, your Honor, to this, we object to these charts as not true and correct copies. He has stated that they are his own conceptions of his original records. Those are secondary and not proper.

The COURT.—You say you made these from something else?

The COURT.—The objection will be overruled.

These large charts are made up by copying the original records. Each of the original curves is on a separate sheet because they were taken on separate gauges. Of necessity they had to be. Then to be able to compare them in relation to the time, it was necessary to put them on the same base so each record here was transferred to a single sheet. The witness has the originals here of all of them. The gauge charts and the [504] impact recorder charts are all in a box and they are all collectively offered as Plaintiff's Exhibit 207. There are sixteen original charts of the gauges. Those lines on the charts are drawn on smoked paper. The charts were smoked so that the marking could be done by a very light pressure on the pen-point so as to make the gauge as sensitive as possible to small variations. Whereupon the box containing six rolls and fifteen dials was admitted in evidence as Plaintiff's Exhibit 207.

(Testimony of Frederick Ray.)

The witness produces the impact responsive and indicating mechanism which he employed and states that it is in the form of an elbow placed on the end of the discharge pipe so that the concrete came in one opening and turned through at an angle of 90° and was discharged out of the other opening. This impact recording device consists of a rubber diaphragm supported around the edges, against the center of which rests a plunger which, in turn, is connected up by suitable leverage and that operates a pencil in contact with this moving strip of tape. This surface of the diaphragm was on a plane of 45° from the axis of the entrance to the elbow. The result of that was that as each slug came through the pipe it impacted against this diaphragm as it was turned around through this 90° angle before it left the angle. At each impact it moved this lever and there was a mark recorded upon the paper which was drawn through at a uniform rate. Whereupon the impact recording apparatus was admitted in evidence as Plaintiff's Exhibit 208. The witness selected one of the original records formed by this impact responsive mechanism and pointed out to the Court that this particular one is marked "No. 1 impact recorder, March 4, 1927," with the signature of the witness upon it. There are two lines—pencil lines running lengthwise on this tape —the lower one [505] being the indication of the timing mechanism. At every half second there is a beat shown which indicates the time during the test. After a number of these beats occur, there is

(Testimony of Frederick Ray.)

shown a series of wavy line movements of the pen pointer in the upper line, which is the line made by the impact recorder. During the first part of this movement of tape this line is perfectly horizontal and during some of this period the air had been turned on to the gun. In due time a slug arrived at the end of the pipe and left its impression on the impact recorder and it is recorded here on this in the form of a wavy motion of this line. There are a series of waves coming quite close together here (indicating). In other words, there are quite a number of slugs coming one after another. It is a very usual operation of these devices. Then after a period of a quarter of a second there were a couple of slugs that came along close together, maybe a small one between and maybe after another quarter of a second another one. Then there is a period here of two seconds or so before there is another appearance of a slug. Then a small one comes and several larger ones there. Then after another half second there are a group of small slugs and then in a quarter of a second several groups of larger ones. There is another second before there is any material group of two or three coming along and another half a second a few more and that, with the exception possibly of a few small ones, is the end of the operation. So all of these tests show results similar, the particular time at which the slugs came and the difference in each case. The witness made several of these records. Five of

(Testimony of Frederick Ray.)

them were produced, one additional being a calibration of the impact recorded.

The witness states that he is familiar with the method of taking motion picture exposures, that he has a motion [506] picture camera of his own and takes pictures from time to time and is generally familiar with it. The witness states that in his opinion motion picture films such as those offered by the defendant here as 191, 192 and 190 are not rapid enough or adequate to show anything about the movement of the slugs issuing from the end of the conduit type of pneumatic concrete placing apparatus. He does not know exactly with what rapidity these particular pictures were taken but the ordinary moving picture camera takes an exposure of about 1/30 or 1/32 of a second. There are sixteen of these per second and such exposures are not rapid enough to show any particular indications as to the discharge. The movement of the concrete and the rocks and the water out of the discharge pipe is so rapid that in order to photograph so that it would be even approximately—appear even approximately stationary—would take a very short exposure. He doubted if a thousandth of a second would be sufficient. It would be even less than that. There is no ordinary moving picture camera that is capable of doing anything of that kind.

The witness heard the testimony of Mr. Wilkins and, after examining Defendant's Exhibit 189, which is an oscillograph record, stated that he is

(Testimony of Frederick Ray.)

familiar with oscillographs and their use in a general way and that in his opinion the reason why one of the lines on defendant's oscillograph record 189 is broader than the other is apparently a difference in the focusing of the light beam.

Mr. TOWNSEND.—We object to that, his testifying upon the subject. He has shown no qualifications so far.

Mr. WILLIAMS.—Perhaps that is right. I will endeavor to qualify him further. [507]

The witness stated that he had taken a degree in physics. He states that an oscillograph is an instrument for recording the variations of current. Usually it is a method of recording. Usually the method of recording its operation is by a light beam which is deflected back and forth by a mirror which is mounted upon oscillating parts of the system or instrument. That, he presumes, was used in this case. The witness has used some instruments similar to this himself. He believes that the reason that the lower line on the oscillograph record is narrower is because the light beam was evidently focused much sharper than in the case of the upper line. In looking over the blue-print of the defendant's test apparatus by which the oscillograph record was made and in listening to the testimony, it was the understanding of this witness that the broad line was the indication at the bottom of the pipe and the sharper line with the greater variations in it, the indications at the top of the pipe. In the witness' opinion, a narrow line indicates the

(Testimony of Frederick Ray.)

minute variations of current better than does the broad line. The broad line would have the tendency of cutting out many of the small ones, throwing them out.

The witness was asked, "Will you state from your observation and experience with this pneumatic placing apparatus whether the so-called slug or segmental formation is more pronounced in a long discharge duct or in a short one and in which they can be best observed and determined?" He answered, "They occur in either a short one or a long one in my opinion but I think there would be a tendency for the slugs to be more pronounced in a long line. The resistance to the movement of the concrete becomes greater as the line is lengthened out. That, in turn, would tend to build up a greater pressure at the discharge of [508] *of* the gun, which, in turn, would have the tendency of making the slugs larger and more pronounced."

The witness then stated that, in practice, the distance that concrete is conveyed of course varies from a comparatively short distance, possibly 50 feet, up to ordinarily several hundred feet and in some instances several thousand feet. The gun is apt to be placed in a position and then as the lining is completed, of course, the distance from this gun to the forms is changing all the time.

Q. Is a discharge duct or pipe twenty feet long, such as was used in making this oscillograph record, offered by the defendants—defendants' exhibit—of sufficient length to exhibit in the most

(Testimony of Frederick Ray.)

pronounced, or in a fairly pronounced fashion the plugs or segmental formations of the discharge conduit?

A. No, it certainly would not be representative of the effect which would occur in a pipe several hundred feet long. The resistance to the discharge of the concrete is not sufficient.

Mr. TOWNSEND.—I will call attention, your Honor, to the fact that the testimony of Mr. Wilkins was not that the pipe was twenty feet long, but that he recorded a travel of twenty feet of concrete in the length of that oscillograph.

The WITNESS.—It is twenty seconds, this is.

Mr. TOWNSEND.—If necessary, I will stipulate that the pipe-line was sixty feet long without recalling Mr. Wilkins.

Mr. WILLIAMS.—Well, if the Court please, I think that we are meeting their testimony.

Mr. TOWNSEND.—I should say eighty feet as shown on the drawing in evidence.

The COURT.—Proceed.

Mr. WILLIAMS.—I do not by my silence assent to the stipulation, [509] of course, or to the proposed stipulation.

Q. Now, will you examine carefully this oscillograph produced by the defendant and state, whether, in your opinion, it exhibits in any degree the formation of slugs or segments?

A. I think that it certainly does.

He states that if one refers first to the fine line which is at the top of the pipe, it is seen that this

(Testimony of Frederick Ray.)

line consists of one continuation of small oscillations with an occasional large one. Now, these small oscillations have been attributed to the difference in the electrical resistance of the concrete within the pipe—that is, the body of the concrete itself depending upon the relative amount of air pressure. In his opinion this resistance, which undoubtedly is varying, is due to the surface coating within the pipe by water and cement extending from one electrode to the other and which resistance would be continually changing due to the air itself flowing along that pipe and causing in effect, waves in that surface material. That is, waves in the liquid itself upon the surface just as waves are created upon water surface by air going over it—ripples, if you wish to call them that. That would account for the slight variations in a more reasonable manner to his mind than thinking that the current was passed directly through the pipe through a body of concrete and air. Now, when a slug of concrete comes along there is more or less of a deposit. A little thicker deposit momentarily at least between the electrodes and the resistance decreases with an increased flow of current, which is indicated upon this chart. In the case of the thick line which is at the bottom of the pipe the coating there naturally would be thicker than at the top due to the gravity effect and, as a [510] result of this chart, we see that the resistance is less and a greater deflection occurs.

(Testimony of Frederick Ray.)

This thicker line also indicates in the same way these slugs. The witness can see nothing in this chart which would dispute the slug theory whatever to his mind. The witness states that the impact recording device which he made use of only operates by the actual impact of some substance upon it. That fact he has demonstrated and proven very clearly by collaboration. The apparatus is so constructed that pressures up to eighteen pounds—that is a static pressure within the pipe up to eighteen pounds, did not affect the impact apparatus. It did not make a mark upon the tape. The pressure at that point was less than eighteen pounds, so that the only thing that did make a mark was the actual impact of some body for weight and inertia.

In the case of gauges they actually show a variation of pressure. Nothing else could affect them except pressure. The presence of the pressure—a pressure wave passing through the pipe to his mind is perfect proof that a slug is passing through because when the pipe was emptied, there was no particular pressure within the pipe—none could be maintained.

Q. Will you state whether the test apparatus used by you was sensitive in any degree whatever to ripplies of water or moisture passing through the duct or to any variations in the amount of water or moisture on the duct wall from time to time?

A. No, those things did not affect the readings of either the gauges or the impact apparatus.

(Testimony of Frederick Ray.)

Q. Would they so affect the apparatus employed as described by the defendant?

A. I consider that it is those effects that are shown mostly [511] in this record.

The COURT.—How many of these slugs did you claim moved a second?

The WITNESS.—There may be twenty or thirty come out in a second. Then there will be an elapse of a second or two when none will pass through. Then there will generally come a group of two or three more in the next quarter second. The reason of that is the feeding of the concrete out of the chamber and into the pipe. That concrete sometimes feeds rapidly and sometimes feeds slowly, depending on how the rocks have crowded into that opening. It is a matter of chance. Sometimes quite a plug of concrete will come out before the rocks will kind of block it up, and another time only a small amount will come out. That is a universal observation that anyone will note in these machines.

The COURT.—Will the discharge be a continuous stream?

The WITNESS.—When there is a bunch of slugs coming out it will appear as a continuous stream for that moment, but there is often a second or two seconds when nothing whatever will come out of the discharge. It is impossible for the naked eye to detect the individual slugs of material issuing from the discharge end of the duct. Of course, it is very easy to detect the several groups of slugs. The

(Testimony of Frederick Ray.)

velocity of the concrete leaving the discharge is a good deal higher than flowing through the pipe as a rule because the pressure blows these slugs right up to the discharge and is then suddenly released and causes the material to move very rapidly—possibly at a speed of a couple of hundred feet a second right at that point. It is very rapid. He has heard the air coming out behind the slug make a noise like the dull boom of a cannon a long distance off, the sudden explosion of that air. [512]

Q. Now, Mr. Ray, I want to take up another subject, namely, the prior art patents and publications which have been offered here by the defendant. Have you read those patents and publications offered by the defendant and looked at the drawings?

A. I have read all of the patents and most of the publications. I think I have gone over all of the publications but I am not quite certain as I did not have the time, quite, to finish the list.

Q. Have you looked to some extent at all, or are there some that you failed to see?

A. I think I have looked at all. I looked at everything that we had. I believe that covered all that were actually offered here.

Q. But you haven't read every word of every one of the publications?

A. No, but practically every word of most of them.

Q. Did you see enough of the substance of the others from a casual glancing or reading, or what-

(Testimony of Frederick Ray.)

ever you did, to have an idea which you are willing to express as to the substance of those disclosures?

A. Yes. I went through them and picked out the parts which appeared to have a bearing on the matter in hand and read that portion at least. [513]

Q. Now, in the question which I am about to ask you relative to the prior art, I wish you would assume that the public use by Shailer, McCormick and McIllvrid at New York, as attempted to be shown by the defendants' depositions involved a use in which fluid grout was pumped into the voids in concrete construction by means of a Cantiff grouter or by means of a McIllvrid grouter. I wish you would assume that the public use by R. A. Shailer and Thomas McCormick at New York involved,—that is, as covered by the depositions offered by the defendant—involved the use of a caisson which was sunk under the pressure of compressed air in which men worked on the floor of the open bottom of the caisson at it was lowered and that a discharge pipe extended outwardly from nearly the bottom of the caisson and sand and other material dug up by the workmen were blown out through the discharge pipe by compressed air in the caisson.

I wish you would assume that the prior use No. 1, by the Union Sulphur Company and others at Sulphur, Crowley and New Orleans, Louisiana, involved the use in which water and oil and sand and gravel were pumped from wells by air lift pumps, the sand and gravel being held in suspension in the

water or oil and carried along by the flow of the liquid, as much as fifty per cent of sand [514] being entrained on some occasions, and that muddy water and mud were sometimes pumped from a hole thirty feet deep by air lift pump.

And I wish that you would assume that the prior use, No. 2, by the Union Sulphur Company, at Sulphur, Louisiana, involved the use in which sulphur was melted by the application of hot water circulated in deep wells. This melted liquid sulphur having the consistency of rusty water or thin syrup, was pumped out of the wells by air pumps and the sulphur was seen to have been discharged in spurts and that the sulphur was not pumped or transported except when in this liquid state.

And I wish that you would assume that the prior use by Willson, Cotton, Warner & Ring, at Miami, Florida, involved a use in which muck and clay-like marl was dredged from the bottom of a waterway by scooping the material, including a large amount of water, into a hopper; that the water with the entrained muck and marl was then sucked into a big cylinder by vacuum produced by condensing steam within the cylinder; that this material was then discharged from the cylinder through a long pipe eighteen inches in diameter, by supplying steam under pressure to the top of the cylinder and the manual valves being operated to control the intake by a discharge from the cylinder, and that water and much occasionally included a stone or a piece of coral carried along in suspension by the water and mud.

(Testimony of Frederick Ray.)

I will, if you wish, if I have not done so, make copies of these assumed hpyotheses available.

Now, with that in hand and with the patents and [515] the publications of the prior art in mind, I wish you would state whether it is possible in your opinion in some manner or degree to classify those disclosures and uses of what is said to be the prior art, and if so to state what the line or lines of that classification are?

Mr. TOWNSEND.—If your Honor please, accepting that the intricate hypothetical question of counsel is an admission practically, that his patent is invalid, I object to it because it is not necessary at this time to burden the Court with the opinion of ancillary councillors under the guise of expert witnesses. We have specifically refrained from offering any attempted explanation of patents as simple as these and which your Honor may understand and will understand by a simple reading of them, and it will be for the attorneys to make the classifications, if any are to be made. I think it would be a great waste of the Court's time to listen here to a dissertation by what Judge Cox has termed "an ancillary councillor under the guise of an expert."

Mr. WILLIAMS.—I have encountered, and I am sure that there are more than a hundred of these publications. There are hundreds of pages of depositions. The question, while it is long in form, asked the witness to asume that the depositions show certain things. Then the question is a simple one, as to whether there is some way of classifying

(Testimony of Frederick Ray.)

these things and if so, what the line of classification is. That classification, if it has been made carefully by someone who undersands the subject matter, it seems to me is a thing that we are [516] entitled to have shown to the Court as a basis for an argument based upon these things, taken somewhat in groups rather than singly. I surely think that the question is material.

The COURT.—You can argue that yourself and make your own classification. The objection will be sustained.

Mr. WILLIAMS.—Exception, please.

The COURT.—Proceed, if you have anything further with this witness. All of the publications have been submitted for what they are worth and they will be argued for what they are worth. Proceed if there is anything further.

Q. Will you explain to the Court, Mr. Ray, the mode of operation of the device and apparatus disclosed in the patents and publications which have been offered in evidence by the defendants here in alleged exemplification of the prior art.

Mr. TOWNSEND.—I object on the same ground. It is the same question.

The COURT.—Sustained. They will show by its very simplicity.

Mr. WILLIAMS.—Note an exception.

The COURT.—Noted. Proceed.

Mr. WILLIAMS.—On behalf of the plaintiff, if the Court please, I offer to prove by this witness that all of the patents, publications and prior uses

offered in evidence by the defendant, and shown or intended to be shown by the depositions fall into two classes; first a class in which merely the flow of liquid is involved or the flow of materials, which follow the laws of [517] liquids in equal distribution of their hydrostatic pressures and in every respect conforming to the flow of liquids. And a second group in which dry pulverant material, such as cement or sand, or gold-dust are carried along in suspension by more or less rapidly moving streams of air or steam or other gas and that in the class involving the flow of liquids and the principles relating to the flow of liquids, there are in some instances examples of entrained material—mud, sand, gravel, sometimes occasionally rock in the mud, dredged from the bottom of a waterway, or a piece of coral dredged from the bottom of a waterway, which is carried along in suspension by the liquid-like material, and that these materials thus carried in suspension where they are finely pulverant material carried along in an air stream or sand or other material carried in a stream of liquid or fluid are in those cases carried wholly by the kinetic energy or by the velocity of the moving stream. That they are not carried by pressure. I offer to make that proof by this witness.

Mr. TOWNSEND.—The same thing applies, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

(Testimony of Frederick Ray.)

The COURT.—Anything further with this witness?

Mr. WILLIAMS.—I wish, Mr. Ray, that you would look at a copy, say, of Kolsche German patent No. 18,394. You have a copy of that available, have you?

A. Yes, sir.

Q. Will you state what scientific principle or principles are involved in the conveyance of the coal dust, sand or [518] other granules there described as being carried or transported by the means there disclosed.

Mr. TOWNSEND.—I will make the same objection. They are now attempting to get at these things piecemeal.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception. And I offer to prove that in the case of this Kolsche German patent, that the materials there described are carried, if at all, wholly by the kinetic energy or velocity of a moving air stream.

The COURT.—Proceed, if you have anything further.

Mr. WILLIAMS.—I take it that your Honor's ruling is that I can—

The COURT.—I have sustained the objection.

Q. Now, will you look, Mr. Ray at the Sickles patent, No. 99,360—

Mr. TOWNSEND.—The same objection, your Honor. He is just getting at the same thing piecemeal.

(Testimony of Frederick Ray.)

Mr. WILLIAMS.—So far, I have only asked the witness to look at the patent.

The COURT.—Wait until the question is put.

Q. Will you state whether or not the conveyance or removal of sand from the bottom of the caisson there shown is in accordance with the mode of operation like that disclosed in the structure of the McMichael patent in suit, or upon some other and different principle.

Mr. TOWNSEND.—Your Honor, the same objection.

The COURT.—Yes. They show for themselves. Objection sustained.

Mr. WILLIAMS.—Exception. I offer to prove that [519] the principle there involved is that of the kinetic energy of an air stream acting wholly by its velocity and not by pressure.

Q. Will you look, Mr. Ray, please, at the Warren patent No. 671,302, sand blast apparatus and state whether or not the sand there described as being shot through the blast conduit is moved by the kinetic energy of the molecules by air impinging upon the several particles of sand or by some pressure, the operation comparable with that involved in the operation of the McMichael apparatus.

Mr. TOWNSEND. — Same objection, for the same reason.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

(Testimony of Frederick Ray.)

Q. Mr. Ray, will you look at the following group of patents namely, Smith patent No. 122,498 and particularly at the package which refers to the amount of liquid concrete which has a consistency such that it will settle to a perfecly level surface; the Golvie patent, No. 676,128, wherein the shooting of grout is described; the Golvie patent No. 676,129, wherein the flow of grout is involved; the Moir patent, 778,878, wherein the movement of fluid lime grout is described; the Thomas patent, No. 873,345, involving a grouting machine and the McIllvrid patent, No. 958,421, disclosing a machine for the flow of grout, and state, if you will, whether there is in those machines, or in their operation or their construction, anything comparable with the mode of construction or the mode of operation of the [520] McMichael patent in suit.

Mr. TOWNSEND.—Same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. I wish, Mr. Ray, you would look at the patent showing lift pump for the flowing by liquids, exemplified in the following publications of patents offered by the defendant, namely, Pohle patents No. 487,639, disclosing the pumping of water; Saunders patent No. 597,023, disclosing the pumping of water; Frasch patent No. 799,642 disclosing the pumping of liquified or molten sulphur; Frasch patent No. 800,127, disclosing the pumping of liquid and molten sulphur; Rix and Donahoo patent No. 635,270 disclosing the pumping of dredged water

(Testimony of Frederick Ray.)

and entrained water or "spoil"; the Frizell patent, No. 233,499, disclosing the pumping of water; the Harris patent No. 759,100 disclosing the pumping from deep wells of fluids such as water or oil, and the Harris patent No. 814,601 disclosing the pumping of water, and I will ask you to state whether any of those patents disclose the transportation of material having the arch forming possibilities or characteristics of concrete forming material, or whether they disclose any other principle of mode of operation such as that involved in the structure and mode of operation of the McMichael patent in suit?

Mr. TOWNSEND. — Same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Mr. Ray, I will ask you to look at the following patents [521] offered in evidence by the defendants and describing the movement of entrained and suspended solids in water or other liquids, particularly Duckham British patent No. 4,400 of 1875 disclosing the liquid flow of mud or entrained spoil with water from dredges; Duckham British patent No. 15,348 of 1885 disclosing the transportation or flow of water with entrained mud or spoil from dredges; the Hussey & Harson patent No. 497,427, disclosing the flow of mud from dredges, including gravel and sand and debris in the water or entrained in the water; Hussey patent No. 526,530, disclosing the pumping of water and muck from

(Testimony of Frederick Ray.)

dredges, including ground, gravel and other debris entrained and carried in suspension in the water; the Rix & Donahoo patent No. 635,270 disclosing the pumping of water and spoil from dredges with the entrained material and the patent of Church No. 487,606, disclosing the pumping and the atomizing and the spraying of alabastrine steel paint or a mixture of alabastrine paint and water, forming a paint-like consistency, for painting or coating the sides of buildings by means of a spray nozzle and I ask you to state whether in connection with those patents—or whether any of them disclose the mode of operation and particularly the formation of slugs in the discharge duct in a manner comparable with that involved in the operation of the apparatus disclosed in the McMichael patent in suit.

Mr. TOWNSEND. — Same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Mr. Ray, I ask you to look at Church patent 487,606 and [522] Rix & Donahoo patent No. 635,270 and ask you to note that they both describe so-called ejectors or injectors. I will ask you to state what the scientific principles are involved in the operation of such ejectors or injectors.

Mr. TOWNSEND.—We make the same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Let me ask you, Mr. Ray, whether these pat-

(Testimony of Frederick Ray.)

ents do disclose ejectors or injectors or devices acting and operating upon the principles of ejectors or injectors.

Mr. TOWNSEND. — Same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Let me ask you, Mr. Ray, whether any of the prior uses assuming them to have been of the character described in the hypothetical question which I asked you somewhat earlier and which I won't repeat—whether in any of those prior uses there was involved a mode of operation and segmental discharge or a slug formation of the materials there handled comparable with that involved in the operation of the McMichael patent in suit or structures such as are described and claimed in the McMichael patent in suit?

Mr. TOWNSEND.—Same objection applies as to the prior uses.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Let me ask you, Mr. Ray, whether any of the devices [523] disclosed in any of these patents or publications offered by the defendant are conforming to the assumption which I have asked you to make relative to the claim of prior uses—whether any of those apparatuses could be used or adapted to be used successfully in the transportation or placement of concrete if they were supplied with concrete forming materials of the character con-

(Testimony of Frederick Ray.)

templated by the McMichael patent in lieu of the materials which they are described as having been intended to handle and without making any changes or modifications in the structure disclosed.

Mr. TOWNSEND.—I make the same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Do you find, Mr. Ray, in any of the patents or publications or assumed uses of the prior art as I have described them a device or means of placing materials of any character, including a vessel, or comprising a vessel for containing the materials in a body with pressure maintained behind the body of the materials, but forcing them into a restricted outlet and a pressure jet, acting to inject air into the materials in the general direction of the outlet?

Mr. TOWNSEND.—Same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Do you find in any of these things, Mr. Ray, a device involving means for causing a jet of air to impinge upon such successive portions of the masses in a vessel such as those disclosed or described in the McMichael [524] patent in the general direction of the discharge duct to control or assist in the formation of the sub-masses through them?

Mr. TOWNSEND.—Same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Will you state, Mr. Ray, the mode of operation and the principles involved in the operation of

(Testimony of Frederick Ray.)

a so-called air lift pump of the character disclosed in several of the patents and publications and the testimony, as you may assume it, of the witnesses, by these depositions.

Mr. TOWNSEND. — Same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. I will ask you whether any principle or mode of operation involved in the operation of these air lift pumps for the handling of any or all of such liquids as are mentioned or described in the patents is comparable in any way with the mode of operation involved in the operation of the McMichael patent?

Mr. TOWNSEND.—Same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception. [525]

The witness testifies that he went downstairs during the recess in the afternoon and looked at the machine offered by the defendant as Defendant's Exhibit 179, said to have exemplified the disclosure of the Canniff patents. The witness, having a copy of the Canniff patent before him and comparing the apparatus in the basement with the device shown and described in the Canniff patent, finds the particular difference is in the connection of the discharge pipe which is marked "D" in the Canniff patent, which is at the left of the structure beyond or on the other side from the chamber beyond the

(Testimony of Frederick Ray.)

air connection which leads into the bottom of the chamber for stirring purposes.

Q. Now, Mr. Ray, can you suggest a reason why the Canniff structure as shown in the patents would be a desirable one for promoting the flow of such a liquid or fluid material as grout?

A. Yes, it is a structure which simply produces pressure—

Mr. TOWNSEND.—(Interrupting.) If your Honor please, he is indulging now in a violation of the ruling of the Court, trying to construe the Canniff machine, which is the Court's prerogative.

The COURT.—I think so. It shows for itself. Objection sustained.

Mr. WILLIAMS.—Exception.

The witness says that the arrangement shown in the Defendant's Exhibit 179 in his opinion, would be capable of transporting concrete to a better advantage and by a different mode of operation than anything that could be derived from the operation of the Canniff mechanism just as it is shown in the Canniff patent. The change in the piping in the exhibit machine itself permits it to be operated as a McMichael machine whereas in the arrangement of pipe shown in the patent it is impossible to so operate it. [526]

Q. I think I will ask you whether there is any suggestion in the Canniff patent of such a change as is incorporated in the Defendant's Exhibit 179 apparatus, or whether in any of the other publications or disclosure patents or the prior art there is

(Testimony of Frederick Ray.)

any suggestion of such a change for bringing about a different mode of operation, or otherwise.

Mr. TOWNSEND.—The patent is the best evidence, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

The COURT.—Anything further? If anything further, proceed; if not, cross-examine.

Mr. WILLIAMS.—That is all with this witness.

The COURT.—Cross-examine.

Cross-examination.

(By Mr. TOWNSEND.)

[The witness believes that the apparatus and parts that he has had introduced during his direct testimony to-day was in town on the previous day though he did not know it at the time he gave his testimony on the previous day. He knew that he had made the test, however, but he was not asked to produce the apparatus when he was called upon to give his opinion of the existence of slugs in the apparatus. He thinks that his counsel knew that the apparatus was in existence. In the photographs he thinks apparatus indicated by Plaintiff's Exhibits 200 to 203 inclusive, the elbow structure that has a hole at the bend is located at the discharge end of the line. That is, one flange is connected to the discharge end of the straight pipe, which is in the foreground and not shown in the exhibit 203. The other opening of the elbow forms the actual discharge of the conduit. On this ex-

(Testimony of Frederick Ray.)

hibit 203 we see a machine of the vertical type in the distance and the discharge point or elbow which the witness [527] refers to and where this vibrator was placed, is towards the viewer of the picture right at the point where the concrete comes out of the pipe so that when the concrete is propelled through that long pipe it is brought to a sudden turn and then dropped. When concrete is blown against an instrument or against a wall, the weight of the concrete due to its velocity causes a pressure or force to be exerted upon the wall or upon anything that it is blown against. The witness has seen things used on the discharge which are very similar to the bend or elbow at the end of the discharge pipe. In some instances the concrete is allowed to pass on in a continuous line but not always. As an engineer, the witness knows that in bringing concrete or any heavy mobile substance to a sudden turn there may be a tendency to choke at that point but, as a matter of fact, choking does not occur as a rule because in most of these pipes there are 90° elbows. The witness thinks that in general 45° elbows are used but that it is not necessary. He thinks that it is better practice in general. There is less danger of blocking in a straight pipe or in one which gives the concrete as near an even continuous motion and movement in the pipe as possible. The witness can tell exactly from the records with what rapidity the apparatus that he has introduced can vibrate. He has not figured it out exactly but figures it at the rate of

(Testimony of Frederick Ray.)

100 or more a second. That machine which the witness made is capable of vibrating about 100 a second. He was in San Francisco on Wednesday, September 7, 1927.]

Redirect Examination.

(By Mr. WILLIAMS.)

He did not hear on or about September 7 that any tests or demonstrations were to be made by the defendant. He knew nothing of the matter whatever at that time. [528]

Mr. WILLIAMS.—I would like to ask counsel to let me see the last notice which he submitted to the Court this morning in that regard.

The COURT.—If any such thing is to be proven, it has to be proven properly.

Mr. TOWNSEND.—The notice, your Honor, is in the file. It was served on counsel Friday, prior to the test.

The COURT.—Very well. Anything further with the witness?

Mr. WILLIAMS.—No, your Honor.

The COURT.—Call your next witness.

(Witness excused.) [529]

TESTIMONY OF HARRY B. KIRKLAND, FOR PLAINTIFF (RECALLED IN REBUTTAL).

HARRY B. KIRKLAND, plaintiff's witness in rebuttal.

I am the Harry B. Kirkland who previously has been sworn and who testified in this case.

(Testimony of Harry B. Kirkland.)

Q. Did you hear the testimony of Mr. Ray relative to the apparatus which was arranged and operated to make graphic records and disclosure of the slug formation and action in the discharge conduit of a McMichael pneumatic placer?

A. Yes, sir.

Q. You heard that? A. Yes, sir.

Q. Did you witness and participate in the demonstrations and tests which he described?

A. Yes, sir.

Q. Did you see made these charts and records?

A. Yes, sir.

Q. Graphs which have been produced here?

A. Yes, sir.

Q. Will you say whether they were made under the conditions as described by Mr. Ray and in your presence? A. Yes, sir, they were.

Q. Can you vouch for the authenticity of the charts and the ribbon graphs as here produced and say that they are the things accepted by Mr. Ray?

A. Yes, sir.

Cross-examination.

These tests were made in a shop building in Chicago, Illinois.

TESTIMONY OF ROY WILKINS, FOR DEFENDANT (RECALLED IN REBUTTAL).

ROY WILKINS, defendant's witness, recalled in rebuttal.

I heard the testimony of Mr. Ray in regard to the tests that he made on this apparatus called a

(Testimony of Roy Wilkins.)

vibrator. I know what that [530] instrument is. I have used such an instrument for other purposes. It is usually used in cases—in such cases where it is required to get a history of the impact. I do not believe that it could be made to determine the flow of concrete through a pipe. My reason for this answer is because it measures impact or the action of a particle against the diaphragm, which is a product of the speed with which the particle is moving and its weight; not a quantity of flow. It is something like recording the impact of a projectile. I do not believe that the vibrator of the plaintiff would record anything if operated in a straight piece of pipe where the concrete was flowing by it or adjacent to it or out of contact [531] with it, except such accidental particles that hit it, that pass by. The instrument which I use in my tests is known as an oscillograph. It is guaranteed by the manufacturers for 5,000 cycles per second which is about ten thousand impulses. I have used it for impulses above two thousand.

Cross-examination.

(By Mr. WILLIAMS.)

Q. I want you to look, Mr. Wilkins, at one of the oscillographs,—not the oscillograph, but impact ribbon records offered by Mr. Ray in connection with, or offered by plaintiff in connection with Mr. Ray's testimony and state—I want you to look at this record and state how many vibrations can be counted per second of time as marked and indicated

(Testimony of Roy Wilkins.)

upon this ribbon. Take the place where they are most frequent?

A. These, I understand are second marks on the bottom?

Q. No, they are half-second marks.

A. With markings of half second on the bottom I think that an accuracy of 40 or 50 could be relied upon and possibly somewhat higher than that with some error.

Q. How many are actually shown there within the period of a second, or what is the highest rate shown on this particular ribbon?

A. Approximately twenty.

Q. How long? A. In a quarter of a second.

Q. That would be eighty in a second.

A. That would be eighty in a second.

Q. You counted only the major ticks, did you not, within that strip?

A. I counted the major ticks where they were the most numerous. [532]

Q. And you omitted the minor variations.

(Witness does not answer.)

Q. How? A. I did, yes, sir.

The COURT.—We will suspend now until tomorrow morning.

(Witness excused.)

Whereupon an adjournment was taken at 4:40 P. M., September 14, 1927, to ten A. M., September 15th, 1927.

(Testimony of Arthur P. Robinson.)

September fifteenth, 1927, ten o'clock A. M.

Court convened, pursuant to adjournment. All parties present.

Counsel for plaintiff offered in evidence, as Plaintiff's Exhibit 209, copies of the patents which were cited during the prosecution of the application for the McMichael patent in suit, the file-wrapper of the McMichael patent as offered in evidence by the defendant not having included such copies of the reference patents. The said reference patents were admitted in evidence.

TESTIMONY OF ARTHUR P. ROBINSON, FOR PLAINTIFF (RECALLED IN REBUTTAL).

ARTHUR P. ROBINSON, plaintiff's witness, recalled in rebuttal.

I am the Mr. Robinson who has previously been called and sworn in this case. I am familiar with concrete construction work and the machinery for it. In mixed concrete 90 to 95 per cent is solids and the balance water. When there is 90 per cent solids and 10 per cent water you have what I would consider a sloppy mixture. It is the medium of sloppiness or wetness and is permissible or feasible for satisfactory concrete construction. A concrete containing 95 per cent solids would be what we consider a very dry concrete—practically no slop.

The Canniff grout machine manufactured by the Ransome Company for many years is still being

(Testimony of Arthur P. Robinson.)

manufactured and sold by [533] the Ransome Company.

Cross-examination.

In regard to the Canniff grouting machine—in regard to the Canniff Ransome concrete machine, are you still making that? A. Yes, sir. [534]

Q. Is that the machine that is an article appearing in the compressed air magazine entitled "Pneumatic Concrete Mixing Machine in New York Subway"?

Mr. WILLIAMS.—If the Court please, that is not germane.

Q. At page 8464, and which has been offered in connection with the New York depositions—exhibit 95. Is that the machine described in that article?

Mr. WILLIAMS.—I object on the ground that the question is not cross-examination. He is asking about an entirely different machine.

The COURT.—Well, the witness will probably answer. He has a right to identify the machine, I think. Overruled.

A. That looks like our machine—some cuts that we used, yes, sir.

Mr. TOWNSEND.—I offer this, your Honor, in explanation of the testimony, as our next exhibit.

(Whereupon said copy of magazine article appearing in the "Compressed Air" magazine at page 8464 was admitted in evidence as Defendant's Exhibit 210.)

The COURT.—This is what now? What is this exhibit supposed to be?

(Testimony of Arthur P. Robinson.)

Mr. TOWNSEND.—This is an article descriptive of the Ransome Canniff pneumatic mixer and placer for concrete—an adaption of the Canniff machine.

The COURT.—I suppose it shows for itself. Anything alse?

Mr. TOWNSEND.—Just one more question.

Q. You speak of the consistency of concrete, Are you acquainted with the publications of the Portland Cement Association? A. Yes, sir.

[535]

Q. I will read this to you and ask if this is a correct statement of transporting concrete. In the article it says, "As in the case of measuring equipment selection of means of transporting from the mixer to place of deposit is ordinarily a question of economy, the only qualification being that the means selected must not interfere with the delivery at the place of deposit of concrete of the proper quality. The design of the mix may be governed largely by the type of equipment to be used in transporting concrete. If chuting equipment is to be used, the slope and length of the chute may be adjusted to permit the movement of the desired mix, or the mix may be adjusted to fit the slope of the chute. The extra cement required to maintain quality with the increased flowability may easily be justified by the saving in transportation cost.

"Care in placing. With a well designed mixture, delivered with proper consistency and without segregation, the placing of concrete is greatly simpli-

(Testimony of Arthur P. Robinson.)

fied but even in those cases, care must be exercised to further prevent segregation and see that the material flows readily into the corners and angles of the forms and around the reinforcement." Is that a good statement of conditions according to your understanding? A. Yes, sir.

Mr. TOWNSEND.—That is all.

Redirect Examination.

(By Mr. WILLIAMS.)

Q. Now, Mr. Robinson, this article that was submitted and which now has been offered as Defendant's Exhibit 210 and which counsel says refers to a so-called Ransome Canniff machine, you have not read that article, I presume? [536]

A. No, sir.

Q. Let me ask you, however, what was the experience of your company, the Ransome Company in connection with its effort to make a concrete mixing and conveying device and which resulted in the thing which is here, as I presume, called the Ransome Canniff machine?

Mr. TOWNSEND.—I object to that as not proper redirect, and, further, it is immaterial what their efforts were. They have testified that they made this machine.

Mr. WILLIAMS.—Now, if the Court please, counsel availed himself of the opportunity, since this witness was on the stand to ask him about this matter which I conceive not to be germane to the direct, and he takes up here a machine which has

(Testimony of Arthur P. Robinson.)

not been referred to. It has been designated here as the Ransome Canniff machine. There is a long article here about it. I expect I know just what the substance of that article may be, although I have not seen the article. He asks the question and he gives me the right to cross-examine, if I so desire. Certainly to follow up the inquiry as to what the significance may be, and that is the reason that I conceived that counsel produces it here—the Ransome Canniff machine.

A. What was the question?

(Question read.)

"Q. Let me ask you, however, what was the experience of your Company, the Ransome Company in connection with its effort to make a concrete mixing and conveying device and which resulted in the thing which is here, as I presume, called the Ransome Canniff machine?" [537]

The COURT.—I cannot see where that would be proper.

Mr. WILLIAMS.—I should like to show by this witness, since this matter has been brought in, that the Ransome Company, owning the right to a new Canniff machine, endeavored for years to utilize that machine for handling concrete and failed. Nevertheless, having adopted the McMichael scheme of operation and structure, they put out a machine, the Ransome Canniff, the name being the name of the Canniff patent. I want to show that they were unable to make that Canniff machine operate and—

The COURT.—(Interrupting.) I think you have covered that. It is not rebuttal. The matter of the Canniff machine was gone into by both parties.

Mr. WILLIAMS.—I know, but for the first time now, counsel brings a publication which designates a machine of the Ransome Company as the Ransome Canniff machine.

The COURT.—If it is not identical or the same thing, the Court will not take notice of it.

Mr. WILLIAMS.—That is all. I will note an exception.

(Witness excused.)

The COURT.—Any further testimony by either party?

Mr. WILLIAMS.—We have none.

Mr. TOWNSEND.—We have none. [538]

Testimony closed.

Mr. TOWNSEND.—In connection with the test that was made in San Francisco on September 7th, with the Smith and the Canniff machines, I would like to have it appear of record that in addition to the invitation extended to the plaintiff and served here in Seattle, I served on Friday the week previous, upon counsel for the plaintiff in San Francisco an identical notice, and if necessary I would like to offer this now and have it filed in connection with the case as exhibit 211.

The COURT.—What is that?

Mr. TOWNSEND.—A notice running to the Concrete Mixing and Conveying Company—

The COURT.—What notice?

Mr. TOWNSEND.—A notice to the plaintiffs and their attorneys.

The COURT.—Now is it acknowledged?

Mr. TOWNSEND.—It is acknowledged by Mr. Van Vliepp (Van Fleet).

Mr. WILLIAMS.—That is in another case. I submit that it is not material or relevant here.

The COURT.—It will be received for what it is worth.

(Notice of time and place of test was admitted in evidence as Defendant's Exhibit 211.)

Mr. WILLIAMS.—If the Court please, I should like to say as a matter of record in that connection that it appears now that some such notice as counsel refers to was served also in this city by handing a copy, as I presume, if I rightly understand, to some clerk in Mr. Helsell's office here in Seattle. For some reason it did not come to Mr. Helsell's attention, nor to the attention of any member of his firm so that they communicated [539] the information in any way to those in Chicago who have been interested in this matter, nor to Mr. Ray—to no one excepting the clerk, and no one except the clerk knew that that notice had been served until it was referred to yesterday for the first time. We are not charging the defendant's counsel for any responsibility for not making better service, but I do wish to show the fact that none of us knew of it.

Mr. CHADWICK.—A duplicate copy was served on Mr. Helsell's office as an accommodation to associate counsel.

Mr. WILLIAMS.—I grant that was the fact.

(Deposition of Thomas S. Leake.)

Mr. HELSELL.—It was served but not delivered to me by the clerk in my office.

The COURT.—The parties will have ten days on each side to file a brief. Go ahead with your argument. [540]

DEPOSITION OF THOMAS S. LEAKE, FOR DEFENDANTS.

Deposition of THOMAS S. LEAKE, taken at Chicago, Illinois, on Monday, September 12, 1927.

B. F. WUPPER, Esquire, on Behalf of Plaintiff.

RALPH M. SNYDER, Esquire, on Behalf of Defendants.

THOMAS S. LEAKE, called as a witness on behalf of the defendants, having been first duly sworn, testified as follows:

Direct Examination.

(By Mr. SYNDER.)

Q. Will you state your full name, please?

A. Thomas S. Leake.

Q. And your age? A. Sixty-seven.

Q. Where do you live, Mr. Leake?

A. In Chicago.

Q. What is the residence address?

A. 6556 Woodlawn Avenue.

Q. And your office is on Michigan Avenue?

A. No. On Dearborn Street.

Q. On Dearborn Street? A. 608.

Q. 608 Dearborn Street? A. Yes, sir.

(Deposition of Thomas S. Leake.)

Q. What is the nature of your business?

A. Well, it is handling water and coal for railroads.

Q. In the handling of water and coal for railroads does that include equipment and maintenance.

A. A little of everything; buildings and everything in connection with coaling stations and water stations. [541]

Q. For how long has that been your general occupation?

A. Oh, I should say about ten years; but before that I was a general contractor.

Q. And as general contractor did you have contact with buildings for railroads and the like?

A. Oh, yes, for twenty years.

Q. That would go back to 1895 or so?

Mr. WUPPER.—Objected to as leading.

A. Somewhere along in there.

Q. And during that period of time you have been contracting generally, have you?

A. Yes; for railroads.

Q. For railroads?

A. Buildings, roundhouses and Y. M. C. A.'s and depots.

Q. In what parts of the country generally has that taken you?

A. That takes from New Orleans to the Dakotas.

Q. You were subpoenaed to testify in this case, were you not, on behalf of the defendant?

A. I suppose so.

Q. The marshal served you with a subpoena?

(Deposition of Thomas S. Leake.)

A. I don't know. I just seen the subpoena and he told me to be here on the 12th. I didn't even read the names on there.

Q. Do you remember testifying on a previous occasion. Mr. Leake, concerning the Leake patent for Improvement in Concrete Mixing and Distributing System, being Patent No. 1,213,558 of February 13, 1927? A. 1917?

Q. Yes, I will show you in just a second. [542]

A. I don't remember anything about it.

Q. Just a minute. I will show you this. You might glance over, Mr. Leake, the part of the testimony taken June 11th of this year and referring to the Leake patent page 5 and from there on.

Mr. WUPPER.—The question is objected to as leading. It is the exclusive prerogative of the cross-examiner to confront the witness with prior testimony. Confronting the witness with his prior testimony vitiates its probative force.

(Witness reads testimony submitted to him.)

Q. (Continued.) I want to know if you remember testifying about the Leake patent for a concrete mixing and distributing system.

A. I never had a patent on it.

Q. What was the patent that you had?

A. I didn't have any. It was objected to by—What do you call it? Stopped me from getting a patent, and I sold out my interest, what I owned there.

Q. Do you recall my showing you the issue of letters patent and a file-wrapper and contents, which

(Deposition of Thomas S. Leake.)

we offered in evidence, on a concrete mixing and conveying system, as Defendants' Chicago Deposition Exhibit 126?

A. Well, the patent was never issued to me that I know of. I sold it to a man, I think you got his name in there, by the name of Bliss; some kind of a stopper put on me getting it, so I didn't pay any more attention to it.

Q. You sold him all your interest in it? [543]

A. No patent ever issued to me that I know of.

Q. Do you remember what the figures were that he paid you for it?

Mr. WUPPER.—I object to that as irrelevant.

A. I don't know now. I think though it was about six thousand dollars, but I wouldn't say for sure.

Q. And was that paid, whatever the amount was?

Mr. WUPPER.—Objected to as irrelevant and immaterial.

A. Yes; from time to time.

Q. All of it has been paid now?

A. Yes; it was all paid out.

Q. Do you remember one of the interference proceedings was with a man named Darley?

A. There was something about it, but I don't know what it was.

Q. William W. Darley?

A. Yes, something about it, I don't know.

Q. That was some time in 1909 or so?

Mr. WUPPER.—I object to that as leading.

A. I couldn't say.

(Deposition of Thomas S. Leake.)

Q. I call your attention to photostatic copy of a preliminary statement which you made in the interference proceedings, made by you in May, 1909, and ask you if you recognize there the reproduction of your signature.

A. Yes; that is mine. I suppose I never read it, because it was made by my attorneys.

Q. I will ask you to read the preliminary statement appearing above your signature, if you will, read it into the record, please.

Mr. WUPPER.—Objected to as incompetent, immaterial and [544] irrelevant and not the best evidence of any statements made therein.

Q. Will you read it out loud into the record, Mr. Leake?

A. Well, I don't ever recall of reading this over. It was made out by an attorney for my signature. Do you want it read now?

Q. Yes, please?

A. (Reading:)

"In the United States Patent Office. Thomas S. Leake vs. William W. Darley. Interference No. 30,335. State of Illinois, County of Cook. Statement of Leake. Filed May 28, 1909. Approved June 25, 1909."

Signed by a Letter "L." I don't know what that is.

"PRELIMINARY STATEMENT.

"Thomas S. Leake of Chicago, in the County of Cook and State of Illinois, being duly sworn doth

(Deposition of Thomas S. Leake.)

depose and say that he is a party to the interference declared by the Commissioner of Patents May 18, 1909, between his application for Letters Patent filed October 7, 1907, Serial No. 396,270, and the application of William W. Darley of Pittsburg, Pennsylvania, for apparatus for Handling Ashes and Other Materials; that He conceived the invention set forth in the declaration of interference on or about the first day of February, 1905, that he first made drawings of the invention on or about the first day of March, 1905; that he first explained the invention to others on or about the first day of June, 1905; that he first embodied his invention in a full sized machine which was completed on or about the first day of September, 1905; and that on or about the first day of September 1905 the said machine was first successfully operated in the City of New Orleans and State of Louisiana, and that he has since made and used other machines embodying the same invention.

"THOMAS S. LEAKE.

"Subscribed and sworn to before me this 26th day of May, A. D. 1909.

ANNIE C. COURTENAY,

"Notary Public of Cook County."

Mr. WUPPER.—Objected to as entirely incompetent, irrelevant [545] and immaterial and not the best evidence of the statements therein, and of a date subsequent to the filing date of the application which resulted in the patent suit.

(Deposition of Thomas S. Leake.)

Q. Mr. Leake, did you testify that this is your signature at the conclusion of that statement?

A. That is my signature on there.

Q. Those statements were true at the time they were made?

A. I did not read it over, I told you before, I never read it.

Q. You have no reason to believe they were not true, have you? A. No.

Q. If they were prepared by your attorney, he was one who was acting in your behalf and had your confidence? A. Yes.

Q. When you signed it you signed it with the thought and intention that it would be used in the interference proceedings in your behalf and on behalf of your application for patent then pending in the Patent Office?

Mr. WUPPER.—Objected to as leading and immaterial.

A. Yes.

Mr. SNYDER.—At this time defendant produces, introduces and offers in evidence certified copy of Interference Proceedings No. 30,335 entitled Darley v Leake, as Defendants' Chicago Deposition Exhibit 130.

Mr. WUPPER.—Objected to as irrelevant, incompetent and immaterial.

Q. This statement in the interference proceedings referred [546] to your pending application for concrete mixing and distributing system, did it?

A. I don't know.

(Deposition of Thomas S. Leake.)

Q. Did you have any other patent application pending that time?

A. There was one. I forget now what it was, but I know I got that patent.

Q. That wasn't any patent Darley was mixed up in, any interference? A. Not as far as I know.

Q. This was the one you referred to as concrete mixing and distributing patent application?

A. Yes, as far as I know.

Q. Do you have any of the drawings that you say here were made on or about the first day of March, 1905? A. There is one general sheet is all.

Q. You say you have one?

A. I don't know whether I got it now. There was one regular sheet?

Q. Of the drawings? A. Yes.

Q. Where would that be? Where would you look for it? A. I looked for it in my office, I suppose.

Q. Do you remember looking for it in connection with the testimony taken in June? A. Yes.

Q. And did you find it then? A. Yes.

Q. I will ask you if this is a copy of the drawing you had in mind.

A. That is taken off of that blue-print; that is taken [547] from a blue-print?

Q. Do you remember letting us have your drawings with a promise to return it, with a stipulation that photostatic copies might be made? A. Yes.

Q. And used in court?

A. Yes. This is the copy of the blue-print.

(Deposition of Thomas S. Leake.)

Q. This is the copy of the blue-print you referred to as a drawing showing that devise.

A. Yes. Well, yes, I suppose it is the same in the patent application papers, you would find that, I think that will show that in the general picture before it goes into details.

Q. I see. Have you any other drawings showing the device? A. Not that I know of.

Q. Referred to here as made in 1905.

A. I was not interested in it any further.

Q. Is the structure which you built in 1905 in New Orleans still in existence? A. I guess it is.

Q. Where would I find that structure.

A. That structure is Stuyvesant Docks in New Orleans.

Q. Is that the building you built or the machines you used?

A. No; that was nothing but a crude machine put up there to see whether I could put concrete up in the air.

Q. What happened after you used that?

A. I tore it down.

Q. Did you keep that?

A. No. It was nothing only a lot of two by four stuff put up with hoops. [548]

Q. So that is not in existence now?

A. Oh, no.

Q. Do you know of any other pictures or blue-prints of that device other than the one you have referred to here? A. No.

Q. What was your position, Mr. Leake, in 1905?

(Deposition of Thomas S. Leake.)

A. Master carpenter.

Q. For what company?

A. Illinois Central Railroad.

Q. And where were you stationed at that time?

A. At Chicago.

Q. You were stationed at Chicago; and did you have occasion to be in New Orleans at that time?

A. I had, a good many times.

Q. In 1905?

A. Oh, I expect so, yes.

Q. Were you engaged in the construction of the Stuyvesant Dock there? A. Yes.

Q. Were you interested there in conveying concrete or similar materials to the roofs of buildings?

A. No; I was not a contractor.

Q. What were your duties there?

A. I was to look over everything between—Everything the Illinois Central owned.

Q. What connection did you have, if any, in connection with the construction of the buildings?

A. Looked after them, to see whether the contractors were building them right, as a representative of the [549] Illinois Central.

Q. Was there very much concrete work used in connection with the building of the Stuyvesant Docks?

Mr. WUPPER.—Objected to as immaterial.

A. Yes.

Q. That was the time that you were engaged in general supervision over the construction of those buildings; is that right?

(Deposition of Thomas S. Leake.)

A. That was years ago before that.

Q. I say at that time you were interested in seeing that those particular buildings were constructed properly; is that right? A. Yes.

Q. Representing the railroad? A. Yes.

Q. That is right, is it? A. Yes.

Q. Do you remember how they were pumping water at that time, using what devices? Were they using air compressors of the like?

A. Yes, air compressors.

Q. That was common practice?

A. No, not common practice.

Q. They were using it down there?

A. Yes.

Q. And had been for some time?

A. Not contractors.

Q. What is that?

A. Not the contractors. Our own men.

Q. Your own men had been using it? [550]

A. Our own; that is, the Illinois Central.

Q. You were then connected with the Illinois Central? A. Yes.

Q. For how long a period had you been using that,—your own men?

A. Right there, I couldn't say.

Q. There or any place.

A. Oh, for years.

Q. To that extent then it was general practice, with your own men using it?

A. Yes; put over deep wells and blew the water out of them with air; but it is costly to do that.

(Deposition of Thomas S. Leake.)

Q. You had that in mind as early as February, 1905, when you stated in this preliminary statement that first conceived the idea of your concrete mixing and distributing system, did you?

Mr. WUPPER.—Objected to as leading.

A. I couldn't say.

Q. You knew of it at least at that time?

A. I knew you could handle water.

Q. Yes. And when you conceived the idea of applying this to moving and distributing concrete, did you mean the application of air pressure?

A. Why do you put the word "distributing" in?

Q. That is used in the patent, as you put it in your application.

Mr. WUPPER.—That is objected to as leading.

Mr. SNYDER.—Now, will you answer the question?

The WITNESS.—Read it over again.

Mr. SNYDER.—Didn't you understand it. [551]

The WITNESS.—No; I did not.

Mr. SNYDER—Read it to him.

(Question was read to the witness.)

A. Do you mean air pressure?

Q. Yes. You say in your preliminary statement that you conceived the invention set forth in the declaration of interference on or about the first day of February, 1905. A. Yes.

Q. And I am asking you whether at that time, when you conceived the idea of moving of concrete as set forth in this application of yours for a pat-

(Deposition of Thomas S. Leake.)

ent, you were familiar with your process of moving water as you had been doing with the Illinois Central at that time. A. Yes, oh, yes.

Mr. SNYDER.—Defendant produces, introduced and offers in evidence the photostatic copy of the drawing of the Leake Automatic Concrete Mixer as Defendants' Chicago Deposition Exhibit 128.

(The exhibit was so marked.)

Mr. WUPPER.—The exhibit is objected to as incompetent, irrelevant and immaterial, and not clearly showing the mechanism it purports to illustrate.

Q. When you reduced to practice the idea that you had as stated in your preliminary statement, did you use any of the compressors that you have been using for water?

A. What do you mean, at New Orleans or here in Chicago?

Q. No; at New Orleans. [552]

A. Yes; I used them that I had been using on water.

Q. You used one of the air compressors that you had been using.

A. Yes; in working on that wall.

Q. I hand you Chicago Deposition Exhibit 127 in the case of Concrete Mixing and Conveying Company vs. Great Western Power Company, being a drawing, and ask you if you recognize having made this drawing. A. Yes, sir.

Q. What is that drawing of, Mr. Leake?

(Deposition of Thomas S. Leake.)

A. It is where I tried out air on concrete.

Q. Will you state what the part marked A represents?

A. That is the container where you put concrete in the top, we just had a hole in it and you pour it, just shot it up there and have the mass on top of that power-house.

Q. What is B?

A. The air pipe going over and coming down here.

Q. Compressor A?

A. No; this is not a compressor. It is the cylinder they put their concrete in. This looks like a compressor.

Q. What is the compressor?

A. This is the ground line.

Q. Referring to E?

A. D is the roof of the power-house and C is the pipe that carries it from the roof of the roundhouse, an exit from the cylinder that holds the concrete.

Q. When you applied the air pressure to A, what happened? [553]

A. It just all went up and landed up here.

Q. That is the concrete in the container A?

A. Yes.

Q. How quick was that? A. Instantly.

Q. And did the mixture come out in substantially the same shape on top of the roof that it was in the container?

(Deposition of Thomas S. Leake.)

A. Well, it came out in—just went all around there in a pile, you know; it was only just a test of three or four times.

Q. Exploded out?

A. Yes; blew right out there and come out.

Q. Did that satisfy you that the idea was a good one and could be used? A. Yes.

Q. At that time had the concrete work been completed on that structure?

A. I couldn't say for sure. I couldn't say that for sure, whether it had or not.

Q. How long did you remain there on that job in New Orleans after constructing this structure?

A. Might have left the night for Chicago or some other place.

Q. Yes. And was it at that time that you left the employment of the Illinois Central?

A. Oh, no; it was after that.

Q. It was after that? A. Yes.

Q. How long afterwards? [554]

A. I wouldn't say.

Q. Sometime that year, was it?

A. No; I suppose a couple or three years afterwards.

Q. When was it you were working for the Missouri-Pacific Railroad?

A. I think it was '07.

Q. And prior to that had you been in the general contracting work for yourself?

A. No, sir; I was with the Illinois Central.

(Deposition of Thomas S. Leake.)

Q. You left the Illinois Central to go with the Missouri-Pacific? A. Yes.

Q. When you testified previously I understood you to say that in 1907 you were not connected with the Illinois Central, but with the Missouri-Pacific, and you left the Illinois Central about the end of 1905 and that you went then with the Missouri-Pacific Railroad. Is that your present recollection?

Mr. WUPPER.—The question is objected to—

A. Yes. I am not sure on those details.

Mr. WUPPER.—Just a minute until I finish my objection. The question is objected to as leading and an improper method of examination, inasmuch as it does not call for the independent recollection of the witness.

Q. You have testified, I believe, that you did not save the apparatus that you used in New Orleans after you had constructed it? A. No, sir.

Q. Will you describe what the construction was, how you put the device together there? [555]

A. Why, this is made of wood.

Mr. SNYDER.—Witness referring to the container A.

A. It is constructed of wood, staved up; it is square and with hoops around it, bound together. Then this had an iron slide on the top, and bottom was hoppered a little bit, some little blocks thrown into the hopper. That is all there is.

Q. Would you say it was constructed as a temporary construction or a permanent one.

(Deposition of Thomas S. Leake.)

A. Oh, temporary; that is all.

Q. Just for temporary use? A. Yes.

Q. Do you remember a conference at your home, in San Francisco early this year with a gentleman who called in connection with asking you about these devices?

Mr. WUPPER.—Objected to as leading.

A. No one called.

Q. What is that? A. No one called.

Q. Were you living in San Francisco then?

A. No, sir.

Q. Were you staying at 1486 B Street, San Diego, California? A. Yes, sir.

Q. Do you remember there a gentleman talked to you along about March first?

Mr. WUPPER.—Objected to as leading.

A. Oh. Some time in the last winter.

Q. And he asked you about this construction down at New Orleans and you talked over the situation?

A. Well, he pushed this stuff up to me. I didn't know [556] what it was. He had a lot of records; I didn't know what they were.

Q. You understood he was trying to get what information you had?

A. I couldn't tell him, you know. I asked him what he wanted and he didn't seem to say what he wanted. I just let him go along and do his own talking. I suppose he thought that I said it.

Q. Did you tell him anything at all about what they had done down at New Orleans? A. No.

(Deposition of Thomas S. Leake.)

Q. Did you tell him that you had built that device down there?

A. I don't know whether I did or not.

Q. You would have no objection to telling him that if that came up in the conversation?

A. Oh, no.

Q. And perhaps make a drawing or watch him make a drawing, to get the best idea of what you were doing at that time?

Mr. WUPPER.—I object as leading.

A. I couldn't have done that. I didn't know what he was after, didn't know what he was doing or anything about it.

Q. You knew he was interested in this idea of raising concrete somewhat like they had raised the water?

A. No. Somebody at 'Frisco wired me he would come and then he sent down some other fellow. It was too far from 'Frisco to Los Angeles for that man that said he wanted to see me and he sent me some other fellow. [557]

Q. You talked the thing over one evening and then the next day he had some more papers and chatted with you a little.

Mr. WUPPER.—Objected to as leading.

A. He was going to catch an early train out of San Diego. He came in a taxi and asked me questions and away he went.

Q. You had a conference one evening and then the next morning he wanted to ask you some more questions?

(Deposition of Thomas S. Leake.)

A. Yes. I think he had asked about a thousand questions anyway.

Q. Do you remember talking over with him that the mixture you blew into this New Orleans structure was one part cement, two and half parts sand and five parts gravel of about one inch size? Does that sound familiar?

Mr. WUPPER.—I object to that as leading, irrelevant and immaterial and as being asked without proper foundation.

A. There may have been gravel in it and there may not. It is twenty years ago and I can't remember.

Q. That sounds familiar?

A. It sounds like the regular mixture we were using down there.

Q. You just run through here the regular mixture that you were using? A. I wouldn't say.

Q. What is your best recollection?

A. That we put it in there.

Q. You wanted to find out what would happen when you applied this air with respect to getting it up to the elevated point? [558] A. Yes.

Q. That was the purpose of your trying this out, was it not, to devise a practical means of getting the concrete up to the higher point?

Mr. WUPPER.—Objected to as leading and calling for the opinion and conclusions of the witness.

A. I wanted to see whether I could do it or not and whether air would put it up there.

(Deposition of Thomas S. Leake.)

Q. And what did you find out?

A. That you could put it up there.

Q. Do you remember building a similar structure here in Chicago a little later, Mr. Leake?

A. A similar what?

Q. Structure here in Chicago, for use here?

Mr. WUPPER.—Objected to as leading.

A. Structure; what do you mean?

Q. In connection with the Webster Building here.

A. I didn't build no structure. I built this machine over at the Webster.

Q. Yes. A. I don't call that a structure.

Mr. SNYDER.—Witness referring to the drawings Defendant's Chicago Exhibit No. 128.

Q. Do you recall when that was?

A. No; I do not.

Q. Was that after you had gone to the Missouri-Pacific Railroad?

A. Oh, it was after. I think it was after I came back here and went in the contracting business.

Q. Sometime in 1907, or so? [559]

Mr. WUPPER.—Objected to as leading.

A. I don't know.

Q. Tell us as much as you can remember of the use of the machine at the Webster Building here in Chicago.

A. Well, I built this machine as shown here.

Mr. SNYDER.—Witness referring to Defendant's Chicago Exhibit 128.

(Deposition of Thomas S. Leake.)

A. And when I got it completed, all I had was cinders. I put in cinders up there and it went up on the fifth floor of their building. Of course, it was not necessary to work all this rocking back and making it automatic. Everything worked but because I had the interference there I dropped it.

Mr. WUPPER.—Objected to as irrelevant and immaterial and as to alleged happenings taking place subsequent to the filing date of the application which resulted in the patent in suit.

Q. That was the same machine in theory, using new materials, but constructed in the same general design as the one you had used in New Orleans, was it not?

A. Oh, no; the New Orleans one had nothing automatic.

Q. But as far as applying the principle of controlling the mixture through the application of air and sending it to the higher point?

A. Oh, no. This takes air on the bottom and top both.

Q. In so far as it takes it out of the top, what can you say as to the operation as compared to the New Orleans operation?

A. Well, the New Orleans, all I did was push the air right out through, but this here has this turning down [560] this air and the air comes in on top.

Q. And both of them practically instantaneously discharge the contents at the upper point?

(Deposition of Thomas S. Leake.)

Mr. WUPPER.—Objected to as leading and calling for the opinion of the witness.

A. Yes.

Q. Do you know who now owns the patent maturing out of your application in interference?

A. No, I do not.

Q. Did you demonstrate the use, how this machine would work, at the Webster plant?

A. Yes; the vice-president, Mr. Perkins, I showed him I could put the cinders up on top.

Q. Was he convinced?

A. Yes; when he looked inside he found they were gone.

Q. What did he say about it before?

A. I couldn't say. Oh, he kind of thought I was just a bug, you know; intimated as though I was a bug; like everybody else, on patents.

Q. Thought it was too good to be true, something along that line? A. I suppose.

Q. About how far up was the outlet of the pipe in the Webster Building where you discharged the mixture?

A. That fifth floor? I don't know. I guess about 12-foot stories, about sixty feet.

Q. And about how high up did you succeed in discharging the mixture in New Orleans?

A. That was about thirty feet.

Q. About thirty feet? [561] A. Yes.

Q. And in both cases it was practically instantaneous?

A. Only the Webster it was not concrete.

(Deposition of Thomas S. Leake.)

Q. It was cinders? A. Yes.

Q. Would the same apply to concrete?

A. I couldn't say.

Q. The same way?

A. I couldn't say that. I don't know whether it would go up five stories high or not with concrete.

Q. Have you made any other structures to determine that? A. No, none whatever, I sold out.

Q. You sold out then? A. Yes.

Q. Did they use the cinders that you had blown through in the construction of the Webster building?

A. No, it was an old building, where they were making this stuff for me, this machine for me.

Q. How did you happen to sell out to Bliss? Did he come to you?

Mr. WUPPER.—Objected to as immaterial and irrelevant.

A. No, he came to my attorney.

Q. Your patent attorney? A. Yes.

Q. Do you remember his initials?

A. No; I do not.

Q. Do you remember who he was connected with?

A. Wilkinson—

Q. With whom? A. Sherwood & Wilkinson. [562]

Q. I mean Mr. Bliss.

A. No; I think he came from Washington. I think he was an attorney down in Washington; I never knew for sure.

(Deposition of Thomas S. Leake.)

Q. Have you got any of the machinery that you demonstrated out at the Webster plant?

A. No.

Q. Do you know where any of that is?

A. No; it was all scrapped, is the way I understand it. I never paid no more attention to it after I sold it.

Mr. SNYDER.—Defendant produces, introduces and offers in evidence the drawing Defendant's Chicago Deposition Exhibit 127.

(The exhibit was so marked.)

Mr. WUPPER.—The exhibit is objected to as incompetent, irrelevant and immaterial, not the best evidence and not proved as to the original.

Q. You made this drawing, did you not, Mr. Leake? A. Yes, sir.

Q. And that is the way it was when you made it? A. Yes, sir.

Mr. SNYDER.—It is stipulated that photostatic copy of the drawing Defendant's Chicago Deposition Exhibit 127 may be received in evidence in lieu of the original, the original to be produced upon demand of the Court or either party at any time.

Q. How large a pipe did you use down there in New Orleans? A. I think it was a four inch.

Q. The regular four-inch pipe? A. Yes.

Q. And how much pressure did you use, do you recall? [563]

A. No. I suppose about sixty or—

Q. Sixty-eight pounds, something like that?

(Deposition of Thomas S. Leake.)

A. Something like that. I wouldn't know for sure. That is only guesswork what I am saying there.

Q. You feel sure that would not be very far off?

A. Well, I think so, not very far off.

Mr. SNYDER.—You may ask him.

Cross-examination.

(By Mr. WUPPER.)

Q. Mr. Leake, referring to Defendant's Chicago Deposition Exhibit 127 you used the machine at New Orleans which is roughly sketched in this exhibit only as an experiment?

Mr. SNYDER.—I object to that as contrary to the record.

A. That is all.

Q. How many charges did you shoot up through the discharge pipe?

A. Probably three or four; maybe a half a dozen; I don't know.

Q. How long did it take for the material to go from the cylinder or chamber A up through the pipe? A. Instantaneously.

Q. To the discharge outlet?

A. Instantaneously.

Q. Please tell us exactly what materials you conveyed by this method.

A. I can't tell you exactly whether I had one, two and a half, five mixed with gravel, or one, two and a half or just sand, at this late date I can't tell. I was satisfied I could put the concrete up on top. [564]

(Deposition of Thomas S. Leake.)

Q. Did you use the same charge over again?

A. No. No. I don't think so. Possibly there was no cement in it, for all I know.

Q. Was it a wet mixture?

A. Oh, yes; it was wet, as I remember.

Q. But to your knowledge you do not know whether there was any cement in it or not?

A. No, I do not. It would look to me as though we were throwing it away, wasting it, if we put cement in there on just trying it out.

Q. And after these experiments were over you did nothing for several years with apparatus of this general type?

Mr. SNYDER.—I object to the question as suggestive, as calling for a conclusion.

A. I couldn't say how many years or anything about it.

Q. It was some extended period at least of a year or two?

Mr. SNYDER.—I object to that as argumentative, as to the form of the question.

A. It was probably two or three years before I built this machine. You see, you are going away back in history that I don't remember.

Q. Then we may assume that any dates you testified to here may be off?

A. Approximate dates.

Q. I believe you testified, Mr. Leake, that the preliminary statement forming a part of Defendant's Chicago Deposition Exhibit No. 130 was prepared by your attorney and that you would not re-

(Deposition of Thomas S. Leake.)

call ever having read it previous to reading it here?

A. No. Put up to me the same as you do to any client that [565] comes in and you tell him to sign it. That is all there is to it.

Q. Then if there were any errors in the preliminary statement they were the errors of your attorney?

Mr. SNYDER.—I object to the form of the question, the assumption of errors, there being no proof there were any.

A. I presume so.

Q. Approximately when was the original of which Defendant's Chicago Deposition Exhibit No. 128 is a copy prepared?

A. I couldn't tell you; I don't know.

Q. Could you give us an approximate date?

A. Well, I should say about '08, '07 or '08; latter part of seven or eight, something like that.

Q. Mr. Leake, did you build any other machines of this nature before you built the machine concerning which you testified you had installed at the Webster plant?

A. The little temporary one at New Orleans.

Q. That is the only one previous to this Webster machine? A. Yes.

Q. Referring to the outfit you had at New Orleans, where was that located?

A. At the Stuyvesant Docks.

Q. Was that on railroad property?

A. Yes, sir.

(Deposition of Thomas S. Leake.)

Q. All people except railroad employees were kept away from the vicinity of that machine?

A. I couldn't say that. I wouldn't say that. It would [566] be a pretty hard job to keep them off a mile and a half of right of way property along the river.

Q. To your knowledge were there any people there other than railroad or contractor employees at the time you made this test?

A. I couldn't say, I wouldn't say.

Q. Referring to your meeting in San Diego with some person with whom you discussed this matter do you recall that person's name? A. No, sir.

Q. Didn't he say whom he represented?

A. Southern Pacific, I believe, Railroad, or something like that, I am not sure.

Q. Have you seen him or heard from him since?

A. No.

Q. At that meeting you discussed all the things concerning which you testified to-day, did you not?

A. Well, I couldn't say whether I did or not.

Q. Did you discuss most of the things?

A. Some of them.

Q. Did you discuss the construction which you had, or the machine which you had had in New Orleans? A. Possibly I did.

Mr. WUPPER.—That is all.

Redirect Examination.

(By Mr. SNYDER.)

Q. When you were building this machine and testing it out down at New Orleans, it was on rail-

road property and you took no special precautions to exclude the public? [567]

A. No, I didn't think it was important enough for that.

Q. You said in answer to a question just asked you by Mr. Wupper, that you tested it out so that you were satisfied it would take concrete up to the roof.

Mr. WUPPER.—Objected to as calling for the conclusion of the witness.

A. Yes.

Q. If there is any question as *by* my accuracy in quoting the testimony, I would be glad to have the stenographer read it. It is correct, I think. A concrete mixture generally means that the mixture is wet, does it not?

A. Well, sometimes you put it in dry, like you put it under water, you *would it* in dry, wouldn't you, and run it down to the bottom.

Q. When you refer generally to a concrete mixture you refer to wet, generally?

A. We think it is so.

Q. That is what you had in mind when you said that you had satisfied your mind that it would transport the concrete satisfactorily? A. Yes.

Q. And if in 1907 or thereabouts you made certain statements in an application on interference proceedings that you had successfully demonstrated the transfer of concrete or cement satisfactorily, that would imply transferring a wet mixture, would it not? A. Yes.

(Deposition of Thomas S. Leake.)

Q. And any statements that you have made along about that time as to what you were doing in 1905 and the accuracy of the dates would be pretty apt to be correct, [568] wouldn't they?

A. They would be approximate; I wouldn't say accurate on account of going back twenty years, I couldn't do that.

Q. Have you any doubt now in mind that you were in New Orleans in connection with the Stuyvesant Docks in 1905 when you tested this out?

A. I haven't any doubt about it, but it could be, you know.

Q. And when you stated in your preliminary statement which you have just identified as made in May, 1909, that you built that plant there and did that work in 1905, that would be the accurate date, would it not?

A. I wouldn't say that; I don't know for sure, you know. I signed all these papers here for my attorney; I don't know.

Q. I would be safe in assuming that that was the actual date? A. I would think so, yes.

Mr. SNYDER.—That is all.

Recross-examination.

(By Mr. WUPPER.)

Q. You never used the material that you elevated by means of a machine which you built at New Orleans? A. Never used it?

Q. Yes. A. Used the machine or—

Q. Used the material which you elevated?

(Deposition of Thomas S. Leake.)

A. No. It didn't look reasonable that I would, you know. I imagine there was no cement in it because we were told not to waste stuff.

Q. That was just a matter of trying out? [569]

A. The air pipe.

Q. The air pressure to see if it would force the material through? A. Yes; that is all.

Mr. WUPPER.—That is all.

Redirect Examination.

(By Mr. SNYDER.)

Q. The effect would be the same whether there was cement in it or not? A. No, sir.

Q. So far as the action of the machine in throwing that up? A. No, sir.

Q. Whether there was or not, your being satisfied that it was satisfactory for moving it up led you to believe that the machine was sufficient for transporting and elevating concrete?

Mr. WUPPER.—Objected to as leading, calling for the conclusion of the witness, and also as matters concerning which the witness has not testified that he has had any experience.

A. It would handle so much smoother with cement in it. And it would stay together better.

Q. So that if it would send the mixture without the cement, it would do it that much easier and more readily with the cement in it?

Mr. WUPPER.—Same objection.

A. Yes.

Mr. SNYDER.—That is all.

(Deposition closed.) [570]

[Endorsed]: Lodged Jan. 7, 1928.

[Endorsed]: Filed Mar. 6, 1928. [571]

[Title of Court and Cause.]

ORDER APPROVING NARRATIVE OF TESTIMONY.

This cause coming on for hearing this 3 day of March, 1928, upon motion of the plaintiff for an order approving the statement of proceedings and narrative of testimony given at the trial of the above-entitled action, and it appearing to the Court that the amendments mentioned in the order of this Court entered on February 14, 1928, have been incorporated into and made a part of the said narrative,

NOW, THEREFORE, IT IS ORDERED that the said narrative of testimony as modified and amended under the direction of this Court be and the same is hereby approved and made a part of the record for the purposes of the appeal of the plaintiff.

Enter.

BOURQUIN,
Judge.

O. K. form.

CHADWICK, McM, R. & R.
For Deft.

[Endorsed]: Filed Mar. 3, 1928. [572]

[Title of Court and Cause.]

DECISION.

This infringement suit involves claims 1, 2, 17, 18, 24, 29, 34 and 35 of McMichael's patent 1,127,660, granted Feb. 9, 1915, on application filed Jan. 14, 1907. The usual defenses are interposed.

The answer alleges there are 10,000 patents in the art, cites one hundred, and there are an extraordinary number of references. For this, palliation is attempted by semi-apologetic "inability to forecast how they may be judged by the Court," which may be taken as a courteous expression of doubt of the Court's comprehension, or of fond hope that it may be deluded.

Of the claims in suit, 2, 17, 34 and 35 were held valid in Concrete etc. Co. vs. Corp., 12 Fed. (2) 929, 931. The record of that case —— differs from this at bar.

In the beginning McMichael's application was limited to "improvements in apparatus for transporting granular and plastic building material, such as sand, plaster, mortar and concrete."

Then as now, the apparatus consisted of an upright cylindrical container with hopper bottom terminating in a discharge pipe to the hopper connected by a U bend. Two separately controlled air pipes connected with the container, one at the top, the other near the bottom and pointing downward. The specification in description of function and operation stated that air "under any desired pres-

sure" admitted thru the upper pipe and over the material, by its pressure would force the latter downward and thru the discharge pipe; that as the material passed thru the U bend, it would be more or less [573] tightly packed, which would tend to "hold the water and the granular Material with which it is mixed intact, so that the tendency to flow the water out of the material is eliminated"; that "to loosen the material at the lower end of the hopper should the same become packed, I provide the additional air pipe adapted to discharge air through the material." Of six claims, one only related to the lower air and as follows: "an air pipe to deliver air at the lower end of the hopper, substantially as described." McMichael's prosecution of the application was dilatory to the limit of time, once incurring forfeiture.

After more than two years, interference was declared with Leake. The latter's application had been filed Oct. 7, 1907, and was for "improvements in a cement mixing and distributing system * * * for preparing a concrete mixture and delivering it."

Leake's apparatus contained all of McMichael, and more, but without the U-bend.

Its air pipes were a single control, and that for the lower air terminated in three nozzles opposed in one plane. In function and operation Leake's specification stated that the upper air would force the concrete down past the said nozzles, "where it

can be detached in portions and blown" into and thru the discharge pipe.

Several of his claims were variations of this, following, viz. "the method of conducting plastic material thru a closed conduit which consists in introducing the plastic material in a mass in a chamber connected to said conduit, introducing relatively compressed air behind the whole mass and behind a front portion thereof, and thereby detaching successive portions and driving them from the chamber into the conduit and along the latter."

For the purposes of interference, to McMichael the Commissioner suggested four claims including the claim aforesaid *verbatim* from Leake, which McMichael promptly accepted as substitutes for his six thereupon cancelled by him. The interference was not concluded for that plaintiff became assignee of both applications. Ultimately patents were granted for both, Leake's, 1,215,558, upon [574] Feb. 13, 1917; but whereas McMichael's contains the aforesaid claim *verbatim* from Leake and several like but of some difference in phraseology. Leake's, curiously enough, changed the form theretofore his own, but retained the substance. In the meantime, Bliss, of Washington, had become attorney for both applications, and Jan. 24, 1911, and later, in behalf of McMichael he filed very extensive amendments of specification and claims, increasing the latter to thirty-five.

In the course of these proceedings in McMichael (to which the comment in Greenwalt's case, 3 Fed.

(2) 660, is applicable), the invention is expanded to include method as well as apparatus, and by exclusion is restricted to only concrete. Altho the amended specification included the function originally ascribed to the lower air as aforesaid, it also declared that McMichael had "found" that the lower air is "very effective in aiding the passage of the material into and through" the discharge pipe; that "in cases where the friction" by the mass driven down by the upper air "is serious" the lower air "gives to the material the velocity which is needed to carry it to the remote point of delivery;" that it "acts upon the sub-masses successively * * * the results being thorough commingling of the ingredients" for that "the delivery pipe itself becomes a mixing chamber," but therein "the components are not driven apart or carried to different distances because of differences in specific gravity."

The amendments so far ignore the U bend so prominent in the original application and claimed *eo nomine*, that its function in respect to granular material in the original claimed, is eliminated along with all reference to granular material itself; and in only two or more claims of the patent is it indicated by the statement that the discharge pipe is "provided with a bend," without any function or effect ascribed to it, save that "the material will be more or less tightly packed as it is directed therethrough." The latter standing alone is not beneficial, and because detrimental the U bend in prac-

tice is no longer used or incorporated in the apparatus.

The amended specifications also stated that the upper air is the primary force, the pressure of which "compels the entire mass to escape into the pipe with great rapidity and force," thence assisted in discharge by the lower air.

In practice, the air pressure is maintained at one hundred pounds, and the container holds about two cubic yards or less [575] of concrete. The claims in issue are for apparatus and method in their various elements.

The charge of infringement against defendants is predicated upon their use of Hackley's apparatus, patent 1,619,297 of 1927. This latter is an oblong container, ovoid in cross-section, without upper air pipes, but having four lower air pipes. The discharge pipe is at the bottom and one end, and the disposition of the lower air pipes is entrance at the bottom, pointing towards the discharge pipe, one opening into the entrance of the latter, one opening into the opposite end of the container, and between them open the other two and equalizing the distances between all of them in order. In operation the container filled, the air is first admitted through the pipe opening in the entrance to the discharge pipe, and thereafter thru the others progressively, to the rear as the concrete subsiding in front of them is driven out thru the discharge pipe.

Plaintiff's contentions as they appear in its brief are that McMichael invented (1) the hopper bottomed container, (2) application of compressed air to convey concrete, and (3) the method of the lower air to detach portions of the concrete, which alternating with like slugs of air, are driven thru the discharge pipe.

In respect to the first, containers with hopper bottoms to direct the flow of their contents preceded McMichael for time so long, the memory of man runneth not to the contrary.

In respect to the second, long prior to McMichael were many devices more or less like his, in which the art of compressed air to convey mobile substances was developed and used. Whether or not it had yet been applied to concrete, to the latter is but a new and analogous use devoid of novelty or invention.

The affinity and analogy of concrete to other mobile substances commonly thus conveyed, was recognized by McMichael himself in his association of it with sand and other granular materials in his original application. This subsequent exclusion of all but concrete of those so associated, is suggestive of preparation for litigation [576] to come. To extend the art to concrete when it came into extensive use, not invention, but only common sense, to say nothing of ordinary mechanical skill to be expected in the progress of the art, was required. In principle, it differs none from like extension of the use of a wheelbarrow to convey concrete.

For a principle, appliance and method applied to substances in general, will naturally embrace any new substance, even as a statute relating to a genus will open to include newly created species.

The instant case cannot be distinguished in principle from Concrete etc. Co. vs. Gomery, 269 U. S. 177, wherein it is held that appliances and method of conveying mobile substances by gravity extended to concrete when it came into use, and a subsequent patent to thus convey concrete is invalid.

For gravity, substitute compressed air, and that case "reads on" this.

Moreover, prior to McMichael were patents for appliances and methods to convey concrete by the agency of compressed air. Amongst these are Smith, 122,498 of 1872, Cannif, 873,345 of 1906, and McIlvrid 958,421 of 1905.

In so far as it is argued that some of these are for grout, and will not function with less liquid concrete, the answer is they can be used for any practical flowable concrete, and they have been. They are of the simplicity of McMichael's, and even average intelligence will perceive their ability to operate successfully.

The variety of concrete is not material save in respect to the mere incidentals of pressure and size of container, load, and discharge conduit.

In any apparatus, including McMichael, the concrete must be flowable in quality, and the pressure in due proportion to the weight and friction of the

load ahead of it. To suit these incidentals to circumstances is mechanical and not invention.

And this is true, be the container capacity or load discharged in one slug (continuous stream) or in several shorter slugs.

Adverting to the third of plaintiff's contentions, the first observation is that the slug theory is not proven and is untenable. [577]

With one hundred pounds of air from the primary upper air pipe behind it, the concrete stands not on the order of its going but goes at once, and thru the discharge pipe "with great rapidity and speed."

In these circumstances the upper air does not halt until the lower air has neatly cut off and removed a slug of concrete, nor does the lower air, of like pressure from the common reservoir halt until within the field of its activity has been projected sufficient concrete to form any slug.

In the nature of things, the patent now stipulating what the application originally did not, viz., simultaneous and constant application of both upper the lower air, the lower air can but some disintegrate and aerate the mass of concrete as it rushes by, and thereby lubricate, lighten and assist its flow thru the conduit. The lower air but joins and flows in the same direction and with the stream of concrete.

It may be that if the upper and lower air were alternately applied, some *quasi*-slug action would follow, akin to the action of Saunders' "air-lift

pump," patent 597,023 of 1896, but not when simultaneously applied as here.

Taking McMichael as it is, to expect or secure movement of the concrete in alternate slugs of concrete and air would do violence to the laws of Nature and confound reason. It cannot be done.

Moreover, the proof is clear, by plaintiff's witness as by defendants' and some whom are interested in plaintiff, that the concrete discharges in a continuous aerated or mixed stream of concrete and air and not at all in any slug formation.

As between Wilkins' test discrediting the slug theory and Ray's supporting it, the former's is calculated to more nearly approach accuracy.

Evidently, McMichael "found" the basis of the slug theory in Leake and his claim aforesaid by the Commissioner presented to and adopted by McMichael. Until then, McMichael did not suggest that the lower air had any such function or result; until then, he limited the lower air in some undefined volume and pressure to only sometime use if the material chanced to pack in the hopper, to blow [578] thru the material and loosen it, in function, object and result, nothing but a convenient substitute for a crow-bar.

To thereafter broaden his claims to embrace the idea and method of Leake, avails McMichael nothing. See Hobbs vs. Beach, 180 U. S. 396. The impression irresistibly created by the facts is that after knowledge of Leake, all McMichael's amendments were to include Leake's idea and method, and to

exclude from McMichael's original application all possible that was inconsistent therewith.

Be that as it may, that in McMichael as in Leake the lower air serves a useful purpose, clearly appears; but as between them, in its present aspect in McMichael it is the idea and method of Leake and not McMichael, in that prior to McMichael, Leake had conceived the idea and in 1905 in New Orleans had publicly and successfully employed it in concrete building operations.

For despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence in quality and quantity inspires confidence and constrains conviction of the truth of the fact and beyond reasonable doubt.

Neither of them, however, is inventor of the thing. Before them, it was old in the art.

Amongst many patents asserted to be anticipatory of the idea and use of the lower air, but three need be considered. Of these, the first and second are Duckham's English patents 4400 of 1875, and 15,348 of 1885. They are for apparatus and method to convey the spoil or mud excavated in dredging. To that end are employed a container for the material, compressed air above or behind it to drive it down to and thru the discharge pipe, and like air thru several nozzles in the bottom and pointing towards the discharge pipe, "to keep the mud agitated and prevent any thick deposit in the tank."

The third is Kolsche's German patent 18,394 of 1882 for "apparatus for conveying substances slack,

sandy, or granular material, by means of a current of air."

The apparatus is like McMichael's without the U bend. That is, it is an upright cylindrical container with hopper bottom terminating in a discharge pipe. Compressed air is applied above or behind the material in the container to force it down and into the discharge pipe, and at that point like air is admitted to assist in driving the material thru the pipe. [579]

Without any change, perhaps save adjustments to circumstances as always, Kolsche's apparatus and method will transport concrete as does McMichael's. Kolsche could rightfully devote it to that analogous use. It follows that McMichael's essentially unchanged application of Kolsche to analogous materials and uses, is not invention. In principle, essential design, function, operation, object and result, Kolsche and McMichael are one and the same. Either reads on the other.

Kolsche, if later and devoted to concrete, might infringe McMichael, and by the same token being earlier, he anticipates him.

The same is true of Duckham, especially in respect to McMichael's application originally, and their common use of the lower air to prevent or relieve packing of the material.

It must be remembered that the test of "analogous uses" is not from whence comes and where goes the materials, to what ultimate end or use, their nature, but is the method of conveyance. Although fertil-

izer and flour be unlike and for ends as wide apart as the poles, a wheelbarrow conveying both is devoted to analogous uses, in patent law.

In so far as the third contention counts upon nonseparation of the components in the discharge pipe, this result is imputed to nonexistent slug action and is inconsistent with the claim that the ingredients continue in active mixation thruout the pipe. But note that in the original application this function of the U bend was in relation to granular material only, and with the latter's elimination from the patent, the function was likewise eliminated.

It may be added that the nonseparation of components of plastic materials is due to that mutual cohesiveness which granular materials do not possess. All the elements of McMichael are old. It does not appear that he discovered, invented, combined or made anything new.

That serves to dispose of the case, and the defense of noninfringement needs no more consideration than to note that Hackley's apparatus is a different combination than McMichael's, has no upright cylindrical hopper bottomed container, is without the U bend, employs no upper air save some incidental back pressure, does not discharge slug fashion as claimed is the invention of McMichael, and so, does not infringe. Likewise, of the defense of insufficient supplemental oath to McMichael. It is noted that this was required by [580] the Commissioner, Feb. 18, 1911, was supplied by Bliss, Feb. 17, 1912, purports to have been

executed by McMichael, of Toledo, before Bliss, Jr., in Chicago, March 6, 1911, discloses in some lettering and spelling of McMichael's signature, striking differences from his signature to his application, applies to only part of the claim, and that McMichael sometime died.

The finding and conclusion are that the claims in suit are void for want of novelty and invention.

Decree accordingly.

Nov. 12, 1927.

BOURQUIN, J.

[Endorsed]: Filed Nov 12, 1927. [581]

In the United States District Court for the Western District of Washington, Northern Division.

IN EQUITY—No. 394.

CONCRETE MIXING AND CONVEYING COMPANY,

Plaintiff,

vs.

R. C. STORRIE & COMPANY (a Partnership),

Defendants.

FINAL DECREE.

This cause came on to be heard at this term of court upon the pleadings, proceedings and proofs herein filed on behalf of both parties and was argued by counsel; and thereupon it is, upon consideration thereof,—

ORDERED, ADJUDGED AND DECREED by the Court that plaintiff take nothing by this suit and that the bill of complaint be and the same hereby is dismissed with costs to defendants in the sum of ——— to be taxed according to the rules and practice of this court, and that defendants have execution therefor.

BOURQUIN, J.

Dated: November 26, 1927.

Service of copy of the within final decree received this 19th day of November, A. D. 1927.

BATTLE, HULBERT & HELSELL,
For Plaintiff.

Filed Nov. 28, 1927. [582]

[Title of Court and Cause.]

PETITION FOR APPEAL.

To the Honorable Judges of the Above-entitled Court:

The above-named plaintiff, feeling itself aggrieved by decree made and entered in this cause on the 28th day of November, 1927, does hereby appeal from said decree to the Circuit Court of Appeals for the Ninth Circuit for the reasons specified in the assignment of errors, which is filed herewith, and it prays that its appeal be allowed and that citation issue as provided by law, and that a transcript of the record, proceedings and papers upon which said decree was based, duly authenticated may be sent to the United

States Circuit Court of Appeals for the Ninth Circuit at San Francisco, California; and your petitioner further prays that the proper order, touching the security to be required of it to perfect its appeal, be made, and desiring to supersede the execution of the decree, petitioner here tenders bond in such amount as the Court may require for such purpose, and prays that with the allowance of the appeal, a supersedeas be issued.

WILLIAMS, BRADBURY, McCALEB & HINKLE,
BATTLE, HULBERT & HELSELL,
Solicitors for the Plaintiff. [583]

The petition granted and the appeal allowed, and shall operate as a supersedeas upon petitioner filing a bond in the sum of Two Thousand and no/100 Dollars ($2,000.00) with sufficient surety, to be conditioned as required by law.

EDWARD E. CUSHMAN,
Judge.

Filed Dec. 8, 1927. [584]

[Title of Court and Cause.]

ASSIGNMENT OF ERRORS.

Now on this 8th day of December, 1927, came the plaintiff, by its solicitors, Williams, Bradbury, McCaleb & Hinkle and Battle, Hulbert & Helsell, and says: That the decree entered in the above cause on the 28th day of November, 1927, is erroneous and unjust to the plaintiff, because:

I.

Because the Court erred in dismissing the bill of complaint herein with costs to the defendant.

II.

The Court erred in ordering, adjudging and decreeing that the bill of complaint be dismissed.

III.

The Court erred in not granting the relief prayed for in the bill of complaint.

IV.

The Court erred in not finding the issues herein in favor of the plaintiff with costs against the defendant.

V.

The Court erred in holding claims 1, 2, 17, 18, 24, 29 [585] 34 and 35 void for want of novelty and invention.

VI.

The Court erred in not holding claims 1, 2, 17, 18, 24, 29, 34 and 35, or one or more of them, infringed by the defendants' device.

VII.

The Court erred in holding that the witness Leake had made invention in issue prior to McMichael's filing date.

VIII.

The Court erred in considering and holding that McMichael's or MacMichael's signature on supplemental oath is of doubtful genuineness.

IX.

The Court erred in holding claims of patent in suit void on file-wrapper record.

X.

The Court erred in holding that any prior art structure was capable of satisfactory concrete conveyance.

XI.

The Court erred in holding that McMichael's structure cannot secure movement of concrete in alternate slugs of concrete and air.

And during the trial the Court erred as follows:

XII.

The Court erred in refusing to permit H. B. Kirkland, a witness for the plaintiff, to testify and describe how a concrete lined tunnel is built, as follows:

> Q. I think I will ask you, Mr. Kirkland, to explain or describe, very briefly, how a concrete lined tunnel is built. [586] I do not want you to go into any elaborate detail.
>
> Mr. TOWNSEND.—I make the same objection, your Honor, that this is a patent that speaks for itself.
>
> The COURT.—Objection sustained.
>
> Mr. WILLIAMS.—I would like to have an exception.
>
> The COURT.—Noted.
>
> (Typewritten Record, p. 53; Printed Record, p. ——.)

XIII.

The Court erred in refusing to permit H. B. Kirkland to testify that the City of Seattle and the Engineers for the City of Seattle became interested in the pneumatic placement of concrete at the instance of the plaintiff; that they specified that it should be used on the job and that the contract was then let to R. C. Storrie & Company, as follows:

> Mr. WILLIAMS.—I want to show that it was at the instance of this plaintiff that the city and the engineers became interested in this pneumatic placement, and the answer to that will show that they specified that it should be used on the job and then the contracts were let to R. C. Storrie & Company and they used a method which we say is the infringing method.
>
> The COURT.—That is the only question, whether it was an infringing method or not. That is the only question. How they came to use it is immaterial. Objection sustained.
>
> Mr. WILLIAMS.—Exception I should like to have noted.
>
> (Typewritten Record, p. 63; Printed Record, p. ——.)

XIV.

The Court erred in refusing to admit in evidence as Plaintiff's Exhibit 21 the correspondence between H. B. Kirkland [587] and Mr. Uhden, City Engineer, as follows:

Q. Let me see, you referred to the correspondence you had with Mr. Uhden and produced that. I think I have neglected to offer it in evidence. I do offer it now as Plaintiff's Exhibit 21.

Mr. TOWNSEND.—The correspondence, I understand, was rejected.

Mr. WILLIAMS.—I beg your pardon?

Mr. TOWNSEND.—You were referring to the correspondence?

Mr. WILLIAMS.—Yes.

Mr. TOWNSEND.—That was rejected on objection.

The COURT.—It has not been offered before, I do not believe.

Mr. TOWNSEND.—I object to it on the ground that it is—

The COURT.—Sustained.

Mr. WILLIAMS.—Exception I would like, your Honor.

(Typewritten Record, p. 69; Printed Record, p. ——.)

XV.

The Court erred in refusing to allow plaintiff to interrogate O. W. Peterson, a witness on behalf of the defendant, as follows:

Q. Now since that time the Pacific Gas & Electric Company has used so-called Web-Cox machines on some of its work has it not?

A. One was used, not by the company but by a contractor.

Q. Doing work for the company?

A. Building a tunnel for the company, yes, sir.

Q. Was that machine like the one involved in the suit of this plaintiff against the Ulen Contracting Company [588] of New York, and as shown in the drawing which I now call to your attention?

Mr. TOWNSEND.—I object to that as not proper cross-examination.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

(Typewritten Record, p. 465; Printed Record, p. ——.)

XVI.

The Court erred in refusing to permit the plaintiff to interrogate O. W. Peterson, a witness on behalf of the defendant, as follows:

Q. Will you describe the Web-Cox machine which the Pacific Gas & Electric Company used, as you say?

Mr. TOWNSEND.—I object to that, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

(Typewritten Record, p. 465; Printed Record, p. ——.)

XVII.

The Court erred in refusing to permit the plaintiff to interrogate O. W. Peterson, a witness for the defendant, as follows:

Q. Now, why is it that the Pacific Gas & Electric Company in the placement of concrete

in connection with their tunnel work has not our machines? You have designated the Canniff grouting machines and tanks such as this Smith patent apparatus shown on defendant's photograph, Exhibits 184 and 185 if I may see them?

Mr. TOWNSEND.—I object to that, your Honor, as not proper cross-examination as to why.

The COURT.—Sustained. I do not see that it is [589] material.

Mr. WILLIAMS.—Exception.

(Typewritten Record, p. 468; Printed Record, p. ——.)

XVIII.

The Court erred in refusing to admit in evidence the file-wrapper showing the description of the application for the patent to Roy C. Hackley, No. 1,619,297. (Plaintiff's Exhibit 196 for Identification.)

(Typewritten Record, pp. 517, 518; Printed Record, p. ——.)

XIX.

The Court erred in sustaining the objection of the defendant to the offer of the plaintiff to prove that Hackley, when he filed the application and when he described his machine, described it exactly in accordance with the mode of operation which the plaintiff contends it to have, and that as a result of the filing of the suit a whole new specification and description was substituted.

(Typewritten Record, p. 517; Printed Record, p. ——.)

XX.

The Court erred in refusing to allow the plaintiff to interrogate Shirley Houghton, a witness on behalf of the plaintiff, as follows:

Q. Will you state whether or not a McMichael machine furnished by the plaintiff or its agent was delivered to the Pacific Gas & Electric Company under a contract entered into in 1916 and used by it in construction work and in the pneumatic placement of concrete in Placer County, California, following that date?

(Typewritten Record, p. 529; Printed Record, p. ——.) [590]

XXI.

The Court erred in refusing to allow the plaintiff to interrogate Shirley Houghton, a witness for the plaintiff, as follows:

Q. I will ask you whether the Pacific Gas & Electric Company paid royalties for the use of a McMichael machine so furnished in or about 1916 for the pneumatic placement of concrete in Placer County, California?

(Typewritten Record, p. 529; Printed Record, p. ——.)

XXII.

The Court erred in refusing to permit the plaintiff to interrogate Shirley Houghton, a witness for the plaintiff, as follows:

Q. Do you know whether subsequent to that date the plaintiff or its agent endeavored to lease to the Pacific Gas & Electric Company

McMichael machines for the pneumatic placement of concrete?

(Typewritten Record, p. 529; Printed Record, p. ——.)

XXIII.

The Court erred in refusing to permit the plaintiff to interrogate Shirley Houghton, a witness for the plaintiff as follows:

Q. Let me ask you a further question, whether, since the use of the McMichael machine in the Placer County job—the Auburn Tunnel—in about 1916 or '17 the Pacific Gas or Electric Company has used McMichael machines furnished by the plaintiff or its agents in the pneumatic placement of concrete in construction work which it has since been interested in?

(Typewritten Record, p. 530; Printed Record, p. ——.) [591]

XXIV.

The Court erred in refusing to permit the plaintiff to interrogate Frederick Ray, a witness on behalf of the plaintiff, as follows:

Q. Now in the question which I am about to ask you relative to the prior art, I wish you would assume that the public use by Shailer, McCormick and McIllvrid at New York, as attempted to be shown by the defendants' depositions involved a use in which fluid grout was pumped into the voids in concrete construction by means of a Caniff grouter or by means of a McIllvrid grouter. I wish you would

assume that the public use by R. A. Shailer and Thomas McCormick at New York involved,—that is, as covered by the depositions offered by the defendant—involved the use of a caisson which was sunk under the pressure of compressed air in which men worked on the floor of the open bottom of the caisson as it was lowered and that a discharge pipe extended outwardly from nearly the bottom of the caisson and sand and other material dug up by the workman were blown out through the discharge pipe by compressed air in the caisson.

I wish you would assume that the prior use No. 1, by the Union Sulphur Company and others at Sulphur, Crowley and New Orleans, Louisiana, involved the use in which water and oil and sand and gravel were pumped from wells by air lift pumps, the sand and gravel being held in suspension in the water or oil and carried along by the flow of the liquid, as much as fifty per cent of sand being entrained on some occasions, and that muddy water and mud were sometimes pumped from a hole thirty feet [592] deep by air lift pumps.

And I wish that you would assume that the prior use, No. 2, by the Union Sulphur Company, at Sulphur, Louisiana involved the use in which sulphur was melted by the application of hot water circulated in deep wells. This melted liquid sulphur having the consistency of rusty water or thin syrup, was pumped out

of the wells by air pumps and the sulphur was seen to have been discharged in spurts and that the sulphur was not pumped or transported except when in this liquid state.

And I wish that you would assume that the prior use by Willson, Cotton, Warner & Ring, at Miami, Florida, involved a use in which muck and clay-like marl was dredged from the bottom of a waterway by scooping the material, including a large amount of water, into a hopper; that the water with the entrained muck and marl was then sucked into a big cylinder by vacuum produced by condensing steam within the cylinder; that this material was then discharged from the cylinder through a long pipe eighteen inches in diameter, by supplying steam under pressure to the top of the cylinder and the manual valves being operated to control the intake by a discharge from the cylinder, and that water and muck occasionally included a stone or a piece of coral carried along in suspension by the water and mud.

I will, if you wish, if I have not done so, make copies of these assumed hypotheses available.

Now, with that in hand and with the patents and the publications of the prior art in mind, I wish you [593] would state whether it is possible in your opinion in some manner or degree to classify those disclosures and uses of what is said to be the prior art, and if so

to state what the line or lines of that classification are?

(Typewritten Record, pp. 552–554, inclusive; Printed Record, p. ——.)

XXV.

The Court erred in refusing to permit the plaintiff to interrogate Frederick Ray, a witness for the plaintiff, as follows:

Q. Will you explain to the Court, Mr. Ray, the mode of operation of the device and apparatus disclosed in the patents and publications which have been offered in evidence by the defendants here in alleged exemplification of the prior art?

(Typewritten Record, p. 555; Printed Record, p. ——.)

XXVI.

The Court erred in sustaining objection to the offer of the plaintiff as follows:

Mr. WILLIAMS.—On behalf of the plaintiff, if the Court please, I offer to prove by this witness that all of the patents, publications and prior uses offered in evidence by the defendant, and shown or intended to be shown by the depositions fall into two classes; first a class in which merely the flow of liquid is involved or the flow of materials, which follow the laws of liquids in equal distribution of their hydrostatic pressure and in every respect conforming to the flow of liquids. And a second group in which dry pulverant material, such as cement or sand, or gold-dust are car-

ried along [594] in suspension by more or less rapidly moving streams of air or stream or other gas and that in the class involving the flow of liquids and the principles relating to the flow of liquids, there are in some instances examples of entrained material—mud, sand, gravel, sometimes occasionally rock in the mud, dredged from the bottom of a waterway, or a piece of coral dredged from the bottom of a waterway, which is carried along in suspension by the liquid-like material, and that these materials thus carried in suspension where they are finely pulverant material carried along in an air stream or sand or other material carried in a stream of liquid or fluid are in those cases carried wholly by the kinetic energy or by the velocity of the moving stream. That they are *not carried by pressure.* I offer to make that proof by this witness.

(Typewritten Record, pp. 555, 556; Printed Record, p. ——.)

XXVII.

The Court erred in refusing to allow plaintiff to interrogate Frederick Ray, a witness for the plaintiff as follows:

Q. Will you state what scientific principle or principles are involved in the conveyance of the coal dust, sand or other granules there described as being carried or transported by the means there disclosed?

(Typewritten Record, p. 556; Printed Record, p. ——.)

XXVIII.

The Court erred in refusing the offer of the plaintiff to prove that in the case of the Kolsche German patent the materials there described are carried, if at all, wholly by the [595] kinetic energy or velocity of a moving air stream.

(Typewritten Record, p. 557; Printed Record, p. ——.)

XXIX.

The Court erred in refusing to allow the plaintiff to interrogate Frederick Ray, a witness for the plaintiff, in reference to the Sickles patent No. 99,360, as follows:

Q. Will you state whether or not the conveyance or removal of sand from the bottom of the caisson there shown is in accordance with the mode of operation like that disclosed in the structure of the McMichael patent in suit, or upon some other and different principle.

(Typewritten Record, p. 557; Printed Record, p. ——.)

XXX.

The Court erred in sustaining the objection of the defendant to the following question propounded to Frederick Ray, a witness for the plaintiff:

Q. Will you look, Mr. Ray, please, at the Warren patent No. 671,302, sand blast apparatus and state whether or not the sand there described as being shot through the blast conduit is moved by the kinetic energy of the molecules by air impinging upon the several particles of sand or by some pressure, the

operation comparable with that involved in the operation of the McMichael apparatus.

(Typewritten Record, p. 558; Printed Record, p. ——.)

XXXI.

The Court erred in sustaining the defendants' objection to the following question propounded by the plaintiff to Frederick Ray, a witness for the plaintiff: [596]

Q. Mr. Ray, will you look at the following group of patents namely, Smith patent No. 122,498 and particularly at the package which refers to the amount of liquid concrete which has a consistency such that it will settle to a perfectly level surface; the Golvie patent, No. 676,128, wherein the shooting of grout is described; the Golvie patent No. 676,129, wherein the flow of grout is involved; the Moir patent, 778,878, wherein the movement of fluid lime grout is described; the Thomas patent, No. 873,345, involving a grouting machine and the McIllvrid patent No. 958,421, disclosing a machine for the flow of grout, and state, if you will, whether there is in those machines, or in their operation or their construction, anything comparable with the mode of construction or the mode of operation of the McMichael patent in suit.

(Typewritten Record, p. 558; Printed Record, p. ——.)

XXXII.

The Court erred in sustaining the objection of

the defendants to the question propounded to Frederick Ray, a witness on behalf of the plaintiff, as follows:

Q. I wish, Mr. Ray, you would look at the patent showing lift pump for the flowing by liquids, exemplified in the following publications of patents offered by the defendant, namely, Pohle patents No. 487,639, disclosing the pumping of water; Saunders patent No. 597,023, disclosing the pumping of water; Frasch patent No. 799,642 disclosing the pumping of liquified or molten sulphur; Frasch patent No. 800,127, disclosing the pumping of liquid and molten sulphur; Rix and Donahoo patent No. [597] 635,270 disclosing the pumping of dredged water and entrained water or "spoil" the Frizell patent, No. 233,499, disclosing the pumping of water; the Harris patent No. 759,100 disclosing the pumping from deep wells of fluids such as water or oil, and the Harris patent No. 814,601 disclosing the pumping of water, and I will ask you to state whether any of those patents disclose the transportation of material having the arch forming possibilities or characteristics of concrete forming material, or whether they disclose any other principle or mode of operation such as that involved in the structure and mode of operation of the McMichael patent in suit?

(Typewritten Record, p. 559; Printed Record, p. —.)

XXXIII.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

> Q. Mr. Ray, I will ask you to look at the following patents offered in evidence by the defendants and describing the movement of entrained and suspended solids in water or other liquids, particularly Duckham British patent No. 4,400, of 1875 disclosing the liquid flow of mud or entrained spoil with water from dredges; Duckham British patent No. 15,348 of 1885 disclosing the transportation or flow of water with entrained mud or spoil from dredges; the Hussey & Harson patent No. 497,427, disclosing the flow of mud from dredges, including gravel and sand and debris in the water or entrained in the water; Hussey [598] patent No. 526,530, disclosing the pumping of water and muck from dredges, including ground, gravel and other debris, entrained and carried in suspension in the water; the Rix and Donahoo patent No. 635,270 disclosing the pumping of water and spoil from dredges with the entrained material and the patent of Church No. 487,606, disclosing the pumping and the atomizing and the spraying of alabastrine steel paint or a mixture of alabastrine paint and water, forming a paint-like consistency, for painting or coating the sides of buildings by means of a spray nozzle and I ask you to state whether in connection with

those patents—or whether any of them disclose the mode of operation and particularly the formation of slugs in the discharge duct in a manner comparable with that involved in the operation of the apparatus disclosed in the McMichael patent in suit.

(Typewritten Record, p. 560; Printed Record, p. —.)

XXXIV.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Mr. Ray, I ask you to look at Church patent 487,606 and Rix and Donahoo patent No. 635,270 and ask you to note that they both describe so-called ejectors or injectors. I will ask you to state what the scientific principles are involved in the operation of such ejectors or injectors.

(Typewritten Record, pp. 560, 561; Printed Record, p. —.) [599]

XXXV.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Let me ask you, Mr. Ray, whether these patents do disclose ejectors or injectors or devices acting and operating upon the principles of ejectors or injectors.

(Typewritten Record, p. 561; Printed Record, p. ——.)

XXXVI.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Let me ask you, Mr. Ray, whether any of the devices disclosed in any of these patents or publicatons offered by the defendant are conforming to the assumption which I have asked you to make relative to the claim of prior uses—whether any of those apparatuses could be used or adapted to be used successfully in the transportation or placement of concrete if they were supplied with concrete forming materials of the character contemplated by the McMichael patent in lieu of the materials which they are described as having been intended to handle and without making any changes or modifications in the structure disclosed.

(Typewritten Record, p. 562; Printed Record, p. —.)

XXXVII.

The Court erred in sustaining the objection of the defendants to the question propounded to Mr. Frederick Ray, a witness for the plaintiff, as follows: [600]

Q. Do you find, Mr. Ray, in any of the patents or publications or assumed uses of the prior art as I have described them a device or means of placing materials of any character, including a vessel, or comprising a vessel for containing the materials in a body with pres-

sure maintained behind the body of the materials, but forcing them into a restricted outlet and a pressure jet, acting to inject air into the materials in the general direction of the outlet?

(Typewritten Record, p. 562; Printed Record, p. —.)

XXXVIII.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Do you find in any of these things, Mr. Ray, a device involving means for causing a jet of air to impinge upon such successive portions of the masses in a vessel such as those disclosed or described in the McMichael patent in the general direction of the discharge duct to control or assist in the formation of the sub-masses through them?

(Typewritten Record, p. 562; Printed Record, p. —.)

XXXIX.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Will you state, Mr. Ray, the mode of operation and the principles involved in the operation of a so-called air lift pump of the character disclosed in several of the patents and publications and the testimony, as you may [601] assume it, of the witnesses, by these depositions.

(Typewritten Record, p. 563; Printed Record, p. —.)

XL.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. I will ask you whether any principle or mode of operation involved in the operation of these air lift pumps for the handling of any or all of such liquids as are mentioned or described in the patents is comparable in any way with the mode of operation involved in the operation of the McMichael patent?

(Typewritten Record, p. 562; Printed Record, p. —.)

XLI.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Now, Mr. Ray, can you suggest a reason why the Canniff structure as shown in the patents would be a desirable one for promoting the flow of such a liquid or fluid material as grout?

(Typewritten Record, p. 564; Printed Record, p. —.)

XLII.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. I think I will ask you whether there is any suggestion in the Canniff patent of such a change as is incorporated in the defendant s

Exhibit 179 apparatus, [602] or whether in any of the other publications or disclosure patents or the prior art there is any suggestion of such a change for bringing about a different mode of operation, or otherwise.

(Typewritten Record, p. 565; Printed Record, p. —.)

XLIII.

The Court erred in sustaining the objection of the defendants to the questions propounded to Arthur P. Robinson, a witness for the plaintiff, as follows:

Q. Let me ask you, however, what was the experience of your Company, the Ransome Company in connection with its effort to make a concrete mixing and conveying device and which resulted in the thing which is here, as I presume, called the Ransome Canniff machine.

(Typewritten Record, p. 582; Printed Record, p. —.)

WHEREFORE, the plaintiff prays that the said decree be reversed and the District Court be directed and instructed to enter such decree as prayed for by said bill of complaint, or that the said Circuit Court of Appeals shall reverse and render a proper decree on the record.

WILLIAMS, BRADBURY, McCALEB & HINKLE,

BATTLE, HULBERT & HELSELL,

Solicitors for the Plaintiff. [603]

United States of America,
State of Washington,
County of King,—ss.

Frank P. Helsell, being first duly sworn, on oath, deposes and says; That he is one of the solicitors for the plaintiff above named; that he has read the foregoing assignment of errors, knows the contents thereof, and that the same are true and correct.

FRANK P. HELSELL.

Subscribed and sworn to before me this 8th day of December, 1927.

[Seal] FRIEDA CASWELL TOSTEVIN,
Notary Public in and for the State of Washington,
Residing at Seattle.

Filed Dec. 8, 1927. [604]

[Title of Court and Cause.]

BOND ON APPEAL.

KNOW ALL MEN BY THESE PRESENTS, That we, Concrete Mixing and Conveying Company, a corporation, as principal, and Standard Accident Insurance Company, a corporation, as surety, acknowledge ourselves to be jointly indebted to R. C. Storrie and Company, a partnership, appellee in the above cause, in the sum of Two Thousand no/100 Dollars ($2,000.00), conditioned that

WHEREAS, on the 28th day of November, 1927, in the District Court of the United States for the

Western District of Washington, in a suit pending in that court wherein Concrete Mixing and Conveying Company, was plaintiff, and R. C. Storrie & Company, a partnership, was defendant, numbered on the equity docket as 394, a decree was entered against the said Concrete Mixing and Conveying Company dismissing the bill of complaint with costs to the defendant, and the said Concrete Mixing and Conveying Company having obtained an appeal to the Circuit Court of Appeals and having filed a copy thereof in the office of the Clerk of the court to reverse the said decree, and a citation directed to said R. C. Storrie & Company citing and admonishing them to be and appear at a session of the United States Court of Appeals for the Ninth *District,* to be holden in the city of [605] San Francisco, State of California, not more than thirty (30) days from the date of said citation.

NOW, If the said Concrete Mixing and Conveying Company, a corporation, shall prosecute its appeal to effect and answer all damages and costs if it fail to make its plea good, then the above obligation to be void, else to remain in full force and virtue.

CONCRETE MIXING AND CONVEYING COMPANY.

By BATTLE, HULBERT and HELSELL,
Its Attorneys,

STANDARD ACCIDENT INSURANCE COMPANY.

[Seal] By EVART LAMPING,
Its Attorney-in-fact.

#1828.

State of Washington,
County of King,—ss.

On this 13 day of December, A. D. 1927, before me personally appeared Evart Lamping, to me known to be the attorney-in-fact of the Standard Accident Insurance Company, the corporation that executed the within and foregoing instrument and acknowledged said instrument to be the free and voluntary act and deed of said corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument and that the seal affixed is the corporate seal of said corporation.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal the day and year first above written.

[Seal] GEO. F. FITZGERALD,
Notary Public in and for the State of Washington,
Residing at Seattle.

Bond O. K.

CHARLES E. TOWNSEND,
WM. A. LOFTUS,
S. F. CHADWICK,
Attorneys for Defendant.

The foregoing bond approved this 13th day of December, 1927.

JUDGE CUSHMAN,
Judge.

Filed Dec. 13, 1927. [606]

[Title of Court and Cause.]

ORDER DIRECTING TRANSMISSION OF EXHIBITS TO CLERK OF CIRCUIT COURT OF APPEALS.

This cause coming on to be heard upon the plaintiff's motion that the original paper exhibits be sent by the Clerk of this court to the Circuit Court of Appeals,—

NOW, THEREFORE, IT IS ORDERED, that all of the exhibits, documentary and otherwise, admitted in evidence, including those accompanying the several depositions of the defendants, and also all exhibits marked for identification in the above-entitled action be transmitted by the Clerk of this court to the Circuit Court of Appeals in San Francisco, California, for reproduction so far as is necessary, by the Clerk of the said Circuit Court of Appeals, provided printing not waived unless the C. C. A. so orders.

Enter.

BOURQUIN,
Judge.

[Endorsed]: Filed Feb. 14, 1928. [607]

[Title of Court and Cause.]

PRAECIPE FOR TRANSCRIPT OF RECORD.

To the Clerk of the Above-entitled Court:

You will please prepare a transcript of the record

in this cause to be filed in the office of the Clerk of the United States Circuit Court of Appeals for the Ninth Circuit, upon the appeal allowed December 8th, 1927, and include in the said transcript the following pleadings and papers on file, to wit:

(1) Placita.

(2) Bill of complaint.

(3) Defendant's motion to strike paragraph 5 of the bill of complaint.

(4) Order of Neterer, J., dated May 23, 1924, striking paragraph 5 of the bill of complaint.

(5) Answer.

(6) Amendment to answer.

(7) Order denying defendant's motion for continuance, and directing defendant to file bill of particulars.

(8) Defendant's bill of particulars. [608]

(9) Narrative of testimony of Roy C. Hackley, R. C. Oxenham, Shirley Houghton, H. B. Kirkland, Arthur Robinson, O. R. Brock, Frederick Ray, for plaintiff, and narrative of the testimony and depositions of Philip L. Wilson, George T. Warner, Ernest Cotton, Julian A. Sohon, James McIlvrid, Harry C. LaPorte, Clinton H. Crooks, Joseph C. Rowell, H. L. Terwilger, T. J. McCormick, Roy C. Hackley, Roy Wilkins, O. W. Peterson, for defendant.

(10) Deposition of William H. Larkin, Jr., for defendant (*pro hac verba*).

(11) Deposition of Thomas S. Leake, for defendant (*pro hac verba*).

(12) Opinion of Bourquin, Judge.

(13) Final decree.

(14) Petition for appeal.

(15) Assignment of errors.

(16) Order allowing appeal.

(17) Citation.

(18) Appeal bond.

(19) This praecipe.

(20) Notice to defendant that plaintiff has filed this praecipe and narrative of certain testimony and depositions.

(21) Order of Court approving narrative of testimony and depositions and directing the depositions of William H. Larkin, Jr., and Thomas S. Leake be transmitted to the Clerk of the Court of Appeals *pro hac verba.*

(22) Clerk's certificate of transcript of record.

(23) Plaintiff's paper exhibits as follows:

(1) Articles of incorporation of plaintiff [609] company.

(2) Certificate of good standing of plaintiff company.

(3) Certified copy of letters patent in suit to McMichael.

(5) Certified copy of opinion Judge Learned Hand in Conveying Company vs. Ulen.

(7) Certified copy opinion Judge Augustus N. Hand in Conveying Company vs. Ulen.

(9) Certified copy mandate in cause No. 26235.

(11) (Excerpt from) opinion of Judge Augustus N. Hand in Conveying Company vs. Powers-Kennedy, being the opinion appearing on pages 417–418 of the record in said cause, offered herein as Plaintiff's Exhibit No. 11.

(12) Hackley file-wrapper (reproduce entire file-wrapper).

(13) Drawing.

(14–A) Photograph.

(14–B) Photograph.

(14–C) Photograph.

(14–D) Photograph.

(15–A) Drawing

(15–B) Drawing.

(16) Photograph.

(17–A) Drawing.

(17–B) Drawing.

(19) List of jobs where plaintiff's apparatus was used.

(21) (For identification) Correspondence between plaintiff and Mr. Uhden.

(22) Photograph small type McMichael Machine made by Ransome Company.

(23) Blue-print small type McMichael machine made by Ransome Company. [610]

(24) Photograph larger type McMichael machine made by Ransome Company.

(26) List of jobs where Ransome type McMichael machine was used.

(197) Blue-print and attached instructions Canniff grouting machines.

(198) Drawing early type Ransome machine.

(199) Instructions on early type Ransome machine.

(200) Photograph McMichael Machine.

(201) Photograph.

(202) Photograph.

(203) Photograph showing gauges.

(209) Patents to supplement McMichael file-wrapper.

(24) Defendant's paper exhibits as follows:

(29 Minutes Proceedings Institutions Civil Engineers.

(30 Minutes Proceedings Institutions Civil Engineers.

(134) Certified copy file-wrapper and contents McMichael patent.

(135) File-wrapper Leake patent.

(136) Assignment from Leake to plaintiff.

(140) Copy Smith patent No. 122,497.

(141) Copy Smith patent No. 122,498.

(142) Copy Goodrich Patent No. 317,337.

(143) Copy Goldie patent No. 676,128.
(144) Copy Goldie patent No. 676,191.
(145) Copy Goldie patent No. 707,841.
(146) Copy Moir patent No. 778,878.
(149) Copy Canniff patent No. 873,345.
(151) Copy McIlvrid patent No. 958,421.
[611]
(152) Copy Pohle patent No. 487,639.
(153) Copy Saunders patent No. 597,023.
(155) Copy Frasch patent No. 799,642.
(156) Copy Frasch patent No. 800,127.
(157) Copy Duckham patent No. 4,400 (British).
(158) Copy Duckham patent No. 15,348 (British).
(159) Copy Sickles patent No. 99,360.
(160) Copy Rix & Donahoo patent No. 635,280.
(161) Copy Church patent No. 487,606.
(163) Copy Frizzell patent No. 233,499.
(164) Copy Harris patent No. 759,100.
(165) Copy Harris patent No. 814,601.
(166) Copy Warren patent No. 671,302.
(167) Copy Butler patent No. 660,946.
(168) Copy Kolsche German patent No. 18,394.
(169) Copy Hussey patent No. 497,427.
(170) Copy Hussey patent No. 526,530.
(175) Drawing McCormick machine.
(181) Photograph of Grout gun.
(182) Photograph of Grout gun.

(183) Photographs.
(184) Photograph.
(185) Photograph.

You will also please transmit and certify to the Circuit Court of Appeals original exhibits other than those specified above to be transmitted and certified as physical exhibits, as follows:

(PLAINTIFF'S EXHIBITS.)

(4) Record in Conveying Company vs. Ulen Contracting Company. [612]
(11) Record in Concrete Mixing Co. vs. Powers-Kennedy.
(18) (For identification) Book of photographs.
(20) Piece of concrete.
(204) Gauge.
(205) Timing mechanism.
(206) Five charts.
(207) Boxes containing six rolls and fifteen dials.
(208) Impact recording machine.

(DEFENDANT'S EXHIBITS.)

(179) Canniff machine.
(186) Smith machine.
(188) Drawing testing apparatus.
(189) Oscillograph.
(190) Movie film.
(191) Movie film print.
(192) Movie film print.
(193) Sample of mix.
(194) Sample of mix.

Said transcript to be prepared as required by law and the rules of the United States Circuit Court of Appeals for the Ninth Circuit.

WILLIAMS, BRADBURY, McCALEB & HINKLE,
BATTLE, HULBERT & HELSELL,
Solicitors for Plaintiff.

Filed Jan. 7, 1928. [613]

[Title of Court and Cause.]

DEFENDANT'S PRAECIPE FOR TRANSCRIPT OF RECORD.

To the Clerk of the Above-entitled Court:

In addition to all the pleadings, papers, documents and exhibits specified and included in plaintiff's praecipe for transcript of record, defendants pray that there be included in said record on appeal the several amendments, corrections and additions to plaintiff's suggested condensation and embodied in the accompanying *addendum* for condensation of record on appeal; together with the following papers and matters of record in the court and not included in plaintiff's praecipe, to wit, depositions of the following witnesses omitted from defendant's narrative:

(1) William Keever, S. W. Maxwell, Hicklen J. Landers, John Green, Joseph G. Medlenka, Jac. Frankel and Edmund F. Ivens.

(2) Each and all exhibits, documentary and otherwise, introduced by defendants, including those

accompanying the several depositions of defendants and also all defendant's exhibitis marked for identification.

(3) This praecipe.

(4) Defendant's demand under Rule 58 that plaintiff admit in writing genuineness of publications. [614]

(5) Notice of invitation by defendants to plaintiff in this case to witness defendant's tests on Wednesday September 7, 1927, at San Francisco, Calif., and endorsements thereon.

CHAS. E. TOWNSEND,
WM. A. LOFTUS,
S. F. CHADWICK,
Solicitors for Defendants.

Dated: January 26th, 1928.

[Endorsed]: Received Jan. 26, 1928.
BATTLE, HULBERT & HELSELL,

[Endorsed]: Filed Jan. 26, 1928. [615]

[Title of Court and Cause.]

CERTIFICATE OF CLERK U. S. DISTRICT COURT TO TRANSCRIPT OF RECORD.

United States of America,
Western District of Washington,—ss.

I, Ed. M. Lakin, Clerk of the United States District Court for the Western District of Washington, do hereby certify this typewritten transcript of record, consisting of pages numbered from 1 to 615,

inclusive, to be a full, true, correct and complete copy of so much of the record, papers, and other proceedings in the above and foregoing entitled cause, as is required by praecipes of counsel for plaintiff and defendant filed and shown herein, as the same remain of record and on file in the office of the Clerk of said District Court, and that the same constitute the record on appeal herein from the judgment of the said United States District Court for the Western District of Washington to the United States Circuit Court of Appeals for the Ninth Circuit.

I further certify the following to be a full, true and correct statement of all expenses, costs, fees and charges incurred and paid in my office by or on behalf of the appellant herein, for making record, certificate or return to the United States Circuit Court of Appeals for the Ninth Circuit in the above-entitled cause, to wit: [616]

Clerk's fees (Act of Feb. 11, 1925) for making record, certificate or return, 1602 folios at 15¢	$240.30
Certificate of Clerk to transcript of record, with seal	.50
Certificate of Clerk of original exhibits, with seal	.50
Total	$241.30

I hereby certify that the above cost for preparing and certifying record, amounting to $241.30 has been paid to me by solicitors for appellant.

I further certify that I hereto attach and herewith transmit the original citation issued in this cause.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said District Court, at Seattle, in said District, this 14th day of March, 1928.

[Seal] ED. M. LAKIN,
Clerk United States District Court, Western District of Washington.

By S. E. Leitch,
Deputy. [617]

In the District Court of the United States, for the Western District of Washington, Northern Division.

IN EQUITY—No. 394.

CONCRETE MIXING AND CONVEYING COMPANY,

Plaintiff,

vs.

R. C. STORRIE & COMPANY (a Partnership),

Defendants.

CITATION.

United States of America to R. C. Storrie & Company, a Partnership, GREETING:

YOU ARE HEREBY NOTIFIED that in a certain case in equity in the United States District Court in and for the Western District of Washing-

ton, wherein Concrete Mixing and Conveying Company, is complainant, and R. C. Storrie & Company, a partnership, are defendants, an appeal has been allowed the complainant therein to the Circuit Court of Appeals for the Ninth Circuit.

You are hereby cited and admonished to be and appear in said court at San Francisco, California, thirty (30) days after the date of this citation, to show cause, if any there be, why the order and decree appealed from should not be granted and speedy justice done the parties in that behalf.

WITNESS the Honorable EDWARD E. CUSHMAN, Judge of the United States District Court, for the Western District of Washington, this 8th day of December, 1927.

[Seal] EDWARD E. CUSHMAN,
District Judge.

Copy of foregoing citation received this 8th of December, 192—.

CHADWICK, McMICKEN, RAMSEY & RUPP,

J.,
Attorneys for Defendant.

[Endorsed]: Filed Dec. 8, 1927. [618]

[Endorsed]: No. 5425. United States Circuit Court of Appeals for the Ninth Circuit. Concrete Mixing and Conveying Company, a Corporation, Appellant, vs. R. C. Storrie & Company, a Partnership, Appellee. Transcript of Record. Upon Ap-

peal from the United States District Court for the Western District of Washington, Northern Division.

Filed March 16, 1928.

F. D. MONCKTON,
Clerk of the United States Circuit Court of Appeals for the Ninth Circuit.

By Paul P. O'Brien,
Deputy Clerk.

[Endorsed]: Printed Transcript of Record. Vols. I and II. Filed April 21, 1928. Paul P. O'Brien, Clerk.

No. 5425

United States
Circuit Court of Appeals
For the Ninth Circuit.

CONCRETE MIXING AND CONVEYING COMPANY, a Corporation,

Appellant,

vs.

R. C. STORRIE & COMPANY, a Partnership,

Appellee.

Upon Appeal from the United States District Court for the Western District of Washington, Northern Division.

PROCEEDINGS HAD IN THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT.

At a stated term, to wit, the October Term, A. D. 1927, of the United States Circuit Court of Appeals for the Ninth Circuit, held in the courtroom thereof, in the City and County of San Francisco, in the State of California, on Thursday, the thirty-first day of May, in the year of our Lord one thousand nine hundred and twenty-eight. Present: Honorable WILLIAM B. GILBERT, Senior Circuit Judge, Presiding; Honorable FRANK H. RUDKIN, Circuit Judge; Honorable FRANK S. DIETRICH, Circuit Judge.

[Title of Cause.]

ORDER OF SUBMISSION.

ORDERED above cause argued by Mr. Lynn A. Williams, counsel for the appellant, and by Mr. Charles E. Townsend, counsel for the appellee, and submitted to the Court for consideration and decision, with leave to counsel for the appellant to file a reply brief within fifteen (15) days from date.

At a stated term, to wit, the October Term, A. D. 1927, of the United States Circuit Court of Appeals for the Ninth Circuit, held in the courtroom thereof, in the City and County of San Francisco, in the State of California, on Monday, the twentieth day of August, in the year of our Lord one thousand nine hundred and twenty-eight. Present: Honorable WILL-

IAM H. HUNT, Circuit Judge, Presiding; Honorable HAROLD LOUDERBACK, District Judge.

[Title of Cause.]

ORDER DIRECTING FILING OF OPINION AND FILING AND RECORDING OF DECREE.

By direction of the Honorable William B. Gilbert, Frank H. Rudkin and Frank S. Dietrich, Circuit Judges, before whom the cause was heard, ORDERED that the typewritten opinion this day rendered by this Court in above cause be forthwith filed by the Clerk and that a decree be filed and recorded in the minutes of this Court in accordance with the opinion filed.

[Title of Court and Cause.]

OPINION U. S. CIRCUIT COURT OF APPEALS.

Before GILBERT, RUDKIN and DIETRICH, Circuit Judges.

The appellant brought a suit alleging infringement of Claims 1, 2, 17, 18, 24, 29, and 35 of patent No. 1,127,660, issued February 9, 1915, to John H. McMichael, Assignor, for a "Method of, and an apparatus for, transporting and treating concrete." The application was filed January 14, 1907, and was pending in the Patent Office more than eight years. As originally filed, the application was for

"Improvements in apparatus for transporting granular and plastic building material such as sand, plaster, mortar, and concrete." The apparatus as patented consists of a vertical closed cylinder tapering toward the base to discharge into a U-bend connected with a conduit having an air nozzle at the top of the cylinder and an air nozzle near the entrance to the U-bend, each separately controlled, under pressure of which the concrete material in the chamber is forced through the conduit and carried to the point where it is to be deposited. It was claimed that the appellee infringed by use of the device described in letters patent No. 1,619,297, issued March 1, 1927, to Roy C. Hackley, for a "Concrete Gun," which consists of a horizontal disposed oblong tank, ovoid in cross-section, with the narrow portion disposed downwardly and with a tapering nozzle to which is connected a discharge pipe for conveying the concrete. Air pressure is furnished by four air supply pipes extending within and along the bottom of the container and terminating at different points intermediate the ends of the tank. Into the pipe which terminates nearest the exit the air is first admitted and thereafter into the others in their order until all the concrete is driven into the discharge pipe. In the specifications it is said that the pipe which terminates near the nozzle insures that pressure shall always be present there directing the concrete into the discharge pipe, and that the remaining pipes serve to advance the body of concrete along the bottom of the tank until

the tank is completely emptied. The containers in both the appellant's and the appellee's patents are filled with concrete through openings in the top which are then closed by airtight lids. At the close of the trial the court below found the appellant's patent anticipated and invalid, and that, even conceding its validity, it had not been infringed by the appellee, Concrete Mixing & Conveying Co. vs. R. C. Storrie & Co., 23 Fed. (2d) 131.

GILBERT, Circuit Judge, after stating the facts.—In the prior art were shown numerous patents involving the use of compressed air for conveying through pipes a wide variety of materials such as concrete, crude oil, dredge spoil, sand and water, grain, molten sulphur, etc. As to all prior patents the appellant insists that none is anticipatory of its combination for that they all lack the salient feature thereof, the arch breaking nozzle or anything that could exercise the function thereof. Of the prior patents we find it necessary to refer particularly to but three, the patent to Smith, No. 122,498, of January 2, 1872, and the English patents to Duckham, one No. 4400 of 1875, and one No. 15,348 of 1885. The Smith patent was for "An improvement in the manufacture of concrete pavements and machinery for same." The specifications described the apparatus as specially adapted to the manufacture and convection of concrete composition through pipes so as to set quickly upon reaching its destination and form a solid mass of artificial stone, and uncontradicted

testimony was given of the successful use of the Smith machine in conveying concrete through a pipe by compressed air. The device contained all the features of the appellant's patent except the nozzle for admission of air near the point of exit. The Duckham patent of 1875 was for improvements in discharging mud or soil from dredges. The mud was received in tanks capable of being closed airtight, with the exception of inlets for the compressed air and an outlet for the spoils. In the specifications Duckham said, "I prefer to inject compressed air * * * through a number of nozzles at the bottom of the tank, said nozzles being pointed toward the outlet. By this means the particles are prohibited from settling and are kept in suspension until the whole is expelled from the tank. Compressed air may, moreover, be admitted into the discharge pipe with the same object." We think it indisputable that Duckham in prescribing the use of pipes for the admission of compressed air in the tank, the same distributed along the bottom of the tank and one of them locatable at the exit, presented the use of all that is included in the appellant's combination, save and except the U-bend, an exception which is negligible so far as the present litigation is concerned, and if there is distinction in the fact that Duckham used no air pressure above the contents of the tank and thus omitted one of the features of the appellant's combination, that feature is also absent from the Hackley combination used by the appellee. But the appellant asserts that Duckham was work-

ing with a material which would flow with facility and that the nozzles which he used were intended for no other purpose than to stir up the mud in the bottom of the tank. It is true that Duckham was engaged in moving a material quite different from concrete, but that fact is not of importance on a question of anticipation, Concrete Appliances Co. vs. Gomery, 269 U. S. 177. In his second patent of December 14, 1885, Duckham says: "The mud or spoil was received directly from the dredging buckets in a tank or tanks, whence it was expelled through outlet pipes by means of compressed air admitted at the upper part of the tank, assisted by compressed air and water injected at the bottom of the tank to agitate the mud and prevent thick deposit," and if we may refer to the Engineering Publication Minutes of the Proceedings of the Institution of Civil Engineers (1887) in evidence here, we find that Duckham stated that "with clay or stiff mud, if the nozzles of the air-injection pipes were too small, the compressed air instead of driving out the material simply pierced holes through it, escaping through the discharge pipe and carrying along with it all the liquid and thin material in the tanks. This defect was easily rectified by rearranging and increasing the size of the large injection nozzles, and the apparatus now gives most satisfactory results."

It is assigned as error that the trial court found that Leake had made the invention in issue prior to the date of McMichael's application. In the opinion of the trial court it is said, "Prior to Mc-

Michael, Leake had conceived the idea and in 1905 in New Orleans had publicly and successfully employed it in concrete building operations, for despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence, in quality and quantity, inspires confidence and constrains conviction of the truth of the fact, and beyond reasonable doubt." The McMichael application was filed January 14, 1907, and nine months later on October 7, 1907, was filed Leake's application, which presents everything contained in the McMichael application with the exception of the U-bend. Leake said, "The object of my invention is to provide a method and apparatus for preparing a concrete mixture and delivering it while in a plastic condition to the place where it is to be utilized. Another object of my invention is to move plastic concrete from one place to another by means of air pressure." On May 12, 1909, interference was declared between McMichael and Leake and Wm. W. Darley, who had applied for a patent on "apparatus for handling ashes and other materials." Leake and Darley each filed an affidavit setting forth their respective dates of conception and reduction to practice. Darley was dismissed from the interference as being found subsequent in time to the others. Leake's affidavit stated that he "conceived the invention set forth in the declaration of interference on or about the 1st day of February, 1905, that he first made drawings of the invention on or about the 1st day of March, 1905, and first explained the invention to others on or about the

1st day of June, 1905, that he first embodied his invention in a full-sized machine which was completed on or about the 1st day of September, 1905, and that on or about the 1st day of September, 1905, the said machine was first successfully operated in the City of New Orleans, and State of Louisiana, and that he has since made and used other machines embodying the same invention." Before the interference was declared it was represented on behalf of Leake's application that he had done a large amount of experimental work in connection with his invention. "He has successfully moved concrete from the place where it is mixed to the place where it is to be used, by means of air pressure, using the apparatus disclosed in his application." Again it was said, "He has given considerable time and thought to this matter and has actually constructed several plants where this is done. Their operation is highly successful and appears to be a decided improvement over previously known methods for handling plastic concrete." But no showing was made or evidence offered to carry the McMichael invention farther back than the date of his application, nor was any proceeding had in the Patent Office upon his application until 19 months thereafter when for a consideration of $6,000 Leake assigned his application to McMichael's attorney, who later assigned it to the appellant which had become also the owner of the McMichael application. The long period of inaction and silence on the part of McMichael, unexplained as it is, together with the payment to

Leake of so large a sum of money as $6,000, payable as it was in annual installments until March 1, 1920, is strongly suggestive of the inference that McMichael recognized the priority of Leake's invention and could furnish no proof to the contrary. As a witness for the appellee in the court below, Leake testified that he conceived the idea of moving concrete, as set forth in his application, about February 1, 1905, that he made a container in which to put the concrete and by the means of an air pipe extending therefrom shot it up on top of a power-house then being constructed in New Orleans, that when the air pressure was applied, the concrete all went up and landed on there, that later he built a commercial apparatus in Chicago and operated it in conveying dry cinders to the fifth floor of a building. His testimony, together with his preliminary statement, carried the date of his invention back of that of McMichael and showed an actual reduction to practice by Leake as early as 1905. We find no ground for disturbing the trial court's conclusion. The question at issue was which of two applicants for patent was the inventor. Both presented drawings and plans of the same invention. Leake furnished evidence of the time, place and circumstances of the reduction of his invention to practice. There was no denial of the truth of his testimony. In Armstrong vs. De Forest Radio Telephone & Tel. Co., 280 Fed. 584, 590, it was said: "While it is true that uncorroborated testimony of an inventor is to be accepted with caution * * * yet there is no rule

of law that requires the rejection of the uncorroborated testimony of an inventor as to the date of its conception. The court must be satisfied as to the fact of the demonstration and that the conception was complete." In Reed vs. Cutter, 1 Story, 590, 596, Mr. Justice Story said: "If the invention is effected and put into actual use by the first and original inventor, it is of no consequence whether the invention is extensively known or used, or whether the knowledge or use thereof is limited to a few persons, or even to the first inventor himself.'" So in C. F. Mueller Co. vs. A. Zeregas Sons, 12 Fed. (2d) 517, 518, considering the question which of two was the real inventor, Judge Hough said, "The question of invention as between Mueller and Wild is really only one of veracity. There are no presumptions or artificial rules regulating such an investigation, and the evidence of one witness may be sufficient," citing Thompkins vs. N. Y. Woven Wire etc. Co., 159 Fed. 133. That the testimony of one witness may be sufficient in such a case is held in Mayer vs. A. & H. G. Mutschler, 248 Fed. 911, 914, where it was said that one witness may suffice if the surrounding circumstances are confirmatory.

But it is insisted that neither Leake's combination nor that of Duckham can operate successfully, as does that of the appellant, to convey concrete and pack it at the place where delivered more effectively than could be done by hand tamping, a result which it is said is accomplished by the appellant's delivery of the concrete with velocity and

momentum in successive slugs or parcels The trial judge held that the slug theory is not proven and is untenable, and said, "It may be that if the upper and lower air were alternately applied some quasi slug action will follow, akin to the action of Saunders air lid pump, Patent 597,423 of 1896, but not when simultaneously applied, as here." There was no suggestion of a slug theory in the original application of McMichael, but when the patent was issued, more than eight years later, it was stated in the specifications that the lower air pipe adjacent to the discharge duct "serves the double function of preventing choking in the entrance to the delivery pipe and of supplying air under pressure in sharp jets directly to the delivery pipe itself." The slug theory was obviously adopted, from expressions found in Leake's application in which he proposed the use of a combination consisting of two tanks discharging into a single conduit alternately, by means of which the main body of concrete "can be detached in portions and blown into the conduit and driven along the same." Such a result might be accomplished by the use of his combination but it is not apparent that any slug action occurs in the use of either the McMichael or the Hackley combination. In neither is there intermittent pressure or "sharp jets" of air and in both there must necessarily be exerted a steady and continuous force from the upper and the lower air nozzles combining to drive forward the concrete and deliver it in a practically unbroken stream, and if indeed a temporary obstruction of material at the

exit should occur it is not believed that its release would result in a slug action or a constantly intermittent propulsion of concrete, or that if such an intermittent action could in practice be accomplished any advantage would thereby be attained. The decided weight of the testimony is to the contrary. It is stated in the brief of appellant's counsel that the appellee's engineer, Hackley, admitted that the appellant's apparatus "operates on the slug principle." We do not so understand Hackley's testimony. What he said was that the air mixes with the concrete and as such prevents it from discharging as a solid mass, and that "the mass is broken up into portions which are driven ahead under high velocity by the air discharging from the pipe 34, this being of considerable importance as it positively prevents choking or blocking up of the apparatus." Hackley was speaking only of such breaking up of the discharging column as resulted from the admixture of air and concrete in the discharge pipe. He testified to having had experience in using the appellant's combination and that in so using it the concrete issued in a continuous stream and that in the use of his own device the concrete came out in a continuous stream mixed with the air, that the speed of the discharge thereof could be controlled by the operation of the valves and in use was so controlled as to make it as slow as possible for the purpose of preventing separation of the concrete and to prevent wear on the pipes, and that when the concrete is discharged it flows by gravity down the sides. Brock, a witness

for the appellant, testified that in the Skagit tunnel the concrete, when it came out through the 8-inch discharge pipe, "flowed down gently like over both sides." And such was the testimony of all the witnesses who observed the operation of the device in the Skagit tunnel. In fact there is but one witness for the slug theory, Ray, a consulting engineer and patent expert. He testified, in answer to the question: "How many slugs moved in a second?" "There may be twenty or thirty come out in a second. Then there will be an elapse of a second or two when none will pass through. Then there will generally be a group of two or more in the next quarter second. * * * It is impossible for the naked eye to detect the individual slugs of material issuing from the discharge end of the duct." Wilkins, an electrical engineer, an expert, testified on behalf of the appellee that he was familiar with the apparatus in controversy and had made tests in its operation, that in the use thereof there were no slugs or plugs such as Ray had testified to, that it was a continuous flow of the mixture of air and concrete, and that it issued from the discharge pipe without spurts or dumps. The court below credited the testimony of Wilkins as against Ray, and we think the court was supported by the overwhelming weight of the testimony.

We think that the slug theory, when all is said, has no bearing upon the merits of the present controversy, for whether or not the appellant's apparatus operated to deliver concrete in slugs or

sections, it is very clear that the Hackley apparatus operates in delivering a constant stream of concrete, interrupted only so far as it is interfered with by the air which accompanies it through the discharge pipe. Hackley used a horizontal tank and in his specifications he said: "With the present apparatus the concrete does not tend to pack or bridge around the nozzle as is the case where vertical tanks are used. The mass of concrete which any one air stream is compelled to move is relatively small and unpacked, and therefore the device operates quickly and easily and without danger of becoming clogged." The decisions in Concrete Mixing & Conveying Co. vs. Ulen Contracting Corp., 12 Fed. (2d) 929, and Concrete Mixing & Conveying Co. vs. The Powers Kennedy Company, relied upon by the appellant, were based on records widely different from that in the case at bar.

The decree is affirmed.

[Endorsed]: Opinion. Filed Aug. 20, 1928. Paul P. O'Brien, Clerk.

United States Circuit Court of Appeals for the Ninth Circuit.

No. 5425.

CONCRETE MIXING AND CONVEYING COMPANY, a Corporation,

Appellant,

vs.

R. C. STORRIE & COMPANY,

Appellee.

DECREE U. S. CIRCUIT COURT OF APPEALS.

Appeal from the District Court of the United States for the Western District of Washington, Northern Division.

This cause came on to be heard on the Transcript of the Record from the District Court of the United States for the Western District of Washington, Northern Division, and was duly submitted.

On consideration whereof, it is now here ordered, adjudged, and decreed by this Court, that the decree of the said District Court in this cause be, and hereby is affirmed, with costs in favor of the appellee and against the appellant.

It is further ordered, adjudged and decreed by this Court, that the appellee recover against the appellant for its costs herein expended, and have execution therefor.

[Endorsed]: Decree. Filed and entered Aug. 20, 1928. Paul P. O'Brien, Clerk.

At a stated term, to wit, the October Term A. D. 1928, of the United States Circuit Court of Appeals for the Ninth Circuit, held in the courtroom thereof, in the City and County of San Francisco, in the State of California, on Monday, the first day of October, in the year of our Lord one thousand nine hundred and twenty-eight. Present: Honorable FRANK H. RUDKIN, Circuit Judge, Presiding; Honorable FRANK S. DIETRICH, Circuit Judge; Honorable WILLIAM H. HUNT, Circuit Judge.

[Title of Cause.]

ORDER DENYING PETITION FOR A REHEARING.

Upon consideration thereof, and by direction of the Honorable William B. Gilbert, Frank H. Rudkin and Frank S. Dietrich, Circuit Judges, before whom the cause was heard, IT IS ORDERED that the petition filed September 11, 1928, on behalf of appellant for a rehearing of the above cause be, and hereby is denied.

[Title of Court and Cause.]

ORDER STAYING ISSUANCE OF MANDATE.

Upon application of Messrs. Williams, Bradbury, McCaleb & Hinkle, counsel for the appellant, and good cause therefor appearing, IT IS OR-

DERED that the issuance, under Rule 32, of the mandate of this Court in the above cause be, and hereby is stayed to and including November 6, 1928; and in the event the petition for a writ of certiorari to be made by the appellant herein be docketed in the Clerk's office of the Supreme Court of the United States on or before said date, then the mandate of this Court is to be stayed until after the said Supreme Court passes upon the said petition.

FRANK H. RUDKIN,
United States Circuit Judge.

Dated: San Francisco, California, October 1, 1928.

[Endorsed]: Filed Oct. 1, 1928. Paul P. O'Brien, Clerk.

[Title of Court and Cause.]

CERTIFICATE OF CLERK U. S. CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT TO RECORD CERTIFIED UNDER RULE 38 OF THE REVISED RULES OF THE SUPREME COURT OF THE UNITED STATES.

I, Paul P. O'Brien, as Clerk of the United States Circuit Court of Appeals for the Ninth Circuit, do hereby certify the foregoing two volumes, consisting of six hundred and eighty-one (681) pages, numbered from and including 1 to and including 681, to be a full, true and correct copy of the entire record excluding original exhibits, of the above-entitled cause in the said Circuit Court of Appeals, made pursuant to request of counsel for the appellant, and certified under Rule 38 of the Revised Rules of the Supreme Court of the United States, as the originals thereof remain on file and appear of record in my office.

ATTEST my hand and the seal of the said the United States Circuit Court of Appeals for the Ninth Circuit, at the City of San Francisco, in the State of California, this 12th day of October, A. D. 1928.

[Seal] PAUL P. O'BRIEN,
Clerk.

SUPREME COURT OF THE UNITED STATES

ORDER ALLOWING CERTIORARI—Filed December 10, 1928

The petition herein for a writ of certiorari to the United States Circuit Court of Appeals for the Ninth Circuit is granted. And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ, the case to be heard with No. 501 as one case.

FILE COPY

No. 1 28 4

FILED
NOV 5 1928
CHARLES ELMORE CROPLEY
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1928.

CONCRETE MIXING & CONVEYING COMPANY (a Corporation),
Petitioner,

vs.

R. C. STORRIE & COMPANY (a Partnership),
Respondents.

PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

AND

BRIEF IN SUPPORT THEREOF

AND

APPENDIX CONTAINING OPINIONS AND CERTAIN DECREES OF THE COURTS OF THE SECOND CIRCUIT WITH WHICH THE NINTH CIRCUIT IS IN CONFLICT.

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IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1928.

CONCRETE MIXING & CONVEYING COMPANY (a Corporation),
Petitioner,

vs.

R. C. STORRIE & COMPANY (a Partnership),
Respondents.

PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT.

To the Honorable, The Chief Justice and Associate Justices of the Supreme Court of the United States:

Your petitioner, Concrete Mixing & Conveying Company, respectfully prays for a writ of certiorari to review the judgment of the Circuit Court of Appeals for the Ninth Circuit in the above-entitled cause.

This case involves McMichael patent No. 1,127,660, granted February 9, 1915, for an invention pertaining to the pneumatic transportation and placement of concrete.

The Circuit Court of Appeals for the Ninth Circuit has held the McMichael patent invalid, notwithstanding and

in conflict with two prior decisions[1] by the Circuit Court of Appeals for the Second Circuit holding the same patent to be valid. This petition is filed for the purpose of having your Honors determine the conflict.

The Circuit Court of Appeals for the Second Circuit, **twice** considering the McMichael patent as to certain claims, including Nos. 2, 17, 34 and 35, has found that it covers a new, useful and patentable invention. The Circuit Court of Appeals for the Ninth Circuit has held that the McMichael patent does not disclose patentable subject-matter and has invalidated *these same claims.* As a result of this conflict, a large number of users of pneumatic concrete conveying and placing apparatus, and several manufacturers, in different parts of the United States, are unable to determine whether the McMichael patent is valid or invalid, and can be relieved of their dilemma only by an authoritative decision of this court. In the Second Circuit the McMachiel patent is valid, and your petitioner is there entitled to relief against infringement, whereas in the Ninth Circuit the patent has been held to be invalid, and there your petitioner can have no relief. In the other judicial circuits of the United States the validity of the McMichael patent is open and undetermined.

Your Honors have very recently been petitioned to review one of the Second Circuit decisions sustaining the McMichael patent. (See Powers-Kennedy et al., petitioners, versus Concrete Mixing and Conveying Co., No. 501, October Term, 1928.)

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1 *Concrete Mixing & Conveying Company* v. *Ulen Contracting Corporation et al.*, 12 Fed. (2) 929-931 (Circuit Judges Rogers, Hough and Mack), page 45 of the "Appendix" hereto.

Concrete Mixing & Conveying Company v. *Powers-Kennedy Contracting Corporation et al.*, 27 Fed. (2) 668 (Circuit Judges Manton, Learned Hand and Swan), page 58 of the "Appendix" hereto.

QUESTIONS PRESENTED.

The salient questions presented are:

1. Was the Circuit Court of Appeals for the Second Circuit right when, in the suits of your petitioner versus (1) Ulen Contracting Corporation *et al.*, and (2) Powers-Kennedy Contracting Corporation *et al.*, it found the McMichael patent[1] valid; **or**

Was the Circuit Court of Appeals for the Ninth Circuit right when, in the present case. it held the McMichael patent to be invalid?

2. Was the Circuit Court of Appeals for the Second Circuit right in rejecting the Smith patent No. 122,498 of 1872 as a reference against the patent in suit, and in regarding the peculiar combination of static and velocity air pressure means, including the nozzle "which injects air into the concrete at its entrance into the discharge outlet" as distinguishing the McMichael invention from all prior devices not including such a combination and such a nozzle; **or**

Was the Circuit Court of Appeals for the Ninth Circuit right in finding the McMichael patent anticipated by,

(*a*) The Smith patent—*which admittedly discloses no such combination and no nozzle of any kind.*

---

[1] Claims 2, 17, 34 and 35 of the patent were involved in each of the Courts of Appeals cases, being twice found valid by the Second Circuit Court of Appeals and being held invalid by the Ninth Circuit Court of Appeals. In addition claims 4, 6, 21, 22 and 28 were involved in the Second Circuit cases, and claims 1, 18, 24 and 29 in the Ninth Circuit case. *All claims before the Second Circuit Court of Appeals were held valid, and all claims before the Ninth Circuit Court of Appeals were held invalid.* The conflict between the two Courts of Appeals is fundamental, and is entirely independent of the fact that each of the Courts of Appeals had before it a few claims of the patent which did not happen to be before the other court—due chiefly, of course, to minor differences in the defendants' structures charged to infringe.

(*b*) The alleged 1905 experiment of Thomas Leake—*which admittedly had no such combination and no nozzle of any kind,* and was supported only by a single uncorroborated and unsubstantiated deposition.

(*c*) The British patents to Duckham Nos. 4,400 of 1875 and 15,348 of 1885—disclosing machines which for *many* reasons are structurally incapable of handling concrete, and which patents, while making passing reference to certain *unillustrated* air and water agitator nozzles for stirring mud, do not describe the *location* of any kind of a nozzle in the *position* required by the McMichael patent and which years of practical experience with McMichael's machine have demonstrated is essential to the success of a pneumatic placer of concrete?

3. Was the Circuit Court of Appeals for the Ninth Circuit right when it regarded your Honors' decision in the case of *Concrete Appliances Co.* v. *Gomery,* 269 U. S. 177, as affording a basis upon which to hold the McMichael patent invalid; **or**

Was the Circuit Court of Appeals for the Second Circuit right when (in the Powers-Kennedy case) it distinguished the facts and principles in these suits involving the McMichael patent from the facts and legal principles involved in the Gomery case?

4. Was the Circuit Court of Appeals for the Ninth Circuit right in holding that the alleged prior invention and public use of McMichael's invention by one Thomas Leake was established by the verbal testimony of one witness, given more than twenty years after the alleged event and uncorroborated by any other witness, or by any contemporary device, drawing, photograph or other visible or tangible evidence; **or**

Was the Circuit Court of Appeals for the Second Circuit right when (in the Powers-Kennedy case) it applied the established rule of the Supreme Court, as set forth in *Deering* v. *Winona Harvester Works,* 155 U. S. 286, 300, and many other cases, that an alleged prior invention or public use to defeat an issued patent must be **"proven by evidence so cogent as to leave no reasonable doubt in the mind of the court"?**

5. Was the Circuit Court of Appeals for the Ninth Circuit justified in attaching importance to the alleged 1905 experiment of Thomas Leake, notwithstanding Leake's testimony that the experiment was **discarded and abandoned** immediately after it was made; **or**

Was the Circuit Court of Appeals for the Second Circuit right when (with reference to the alleged prior public use testified to by Artingstall et al. in the Powers-Kennedy case) it said:

> **"Such casual and abandoned uses do not contribute to the stock of knowledge which makes up the art. If we may invalidate a patent upon such prior uses so proved, no patent would be safe"?**

6. Was the Circuit Court of Appeals for the Ninth Circuit justified in accepting as competent evidence, relative to the alleged prior invention and use by Thomas Leake, certain statements appearing in a Patent Office preliminary statement (ex parte affidavit) made by Leake more than a year after McMichael's filing date, and certain statements made more than a year after McMichael's filing date, in Leake's patent application, by Leake's *attorney* (not called as a witness) **or**

Is such evidence inadmissible because unfair and incompetent (as your petitioner contends), being the kind of unfair and incompetent evidence which was strongly condemned by the Circuit Court of Appeals for the Second Circuit in *General Electric Co.* v. *P. R. Mallory & Company,* 298 Fed. 579, 586?

7. Was Judge Bourquin (and inferentially the Ninth Circuit Court of Appeals) right in finding that defendants' machines do not infringe the McMichael patent; **or**

Was the Second Circuit Court of Appeals (and Judge A. N. Hand) right in finding the McMichael patent infringed by machines which are substantially the same as the machines used by the defendants in this case?

BRIEF STATEMENT OF THE PRESENT CASE.

This suit was instituted in the United States District Court for the Western District of Washington. It came on for trial before his Honor Judge Bourquin, District Judge, **after** the McMichael patent had been sustained by both the District Court for the Southern District of New York and the Circuit Court of Appeals for the Second Circuit in the suit of your petitioner versus Ulen Contracting Corporation *et al.*, and after the District Court for the Southern District of New York had sustained the McMichael patent a second time in the suit of your petitioner versus Powers-Kennedy Contracting Corporation *et al.*

His Honor Judge Bourquin, in an opinion filed November 12, 1927 (R., Vol. II, pp. 610-622), found invalid the claims of the McMichael patent which were in suit. A final decree pursuant to said opinion was entered November 26, 1927 (R., Vol. II, pp. 622-623). Your petitioner appealed from such decree to the Circuit Court of Appeals for the Ninth Circuit, the cause being argued in said Court of Appeals on May 31, 1928. Following the presentation of this case to the Circuit Court of Appeals for the Ninth Circuit, but before the filing of an opinion by said Circuit Court of Appeals for the Ninth Circuit, the Circuit Court of Appeals for the Second Circuit handed down its opinion sustaining the McMichael patent a sec-

ond time in the suit of your petitioner versus Powers-Kennedy Contracting Corporation *et al.*

On August 20, 1928, the Circuit Court of Appeals for the Ninth Circuit filed an opinion (R., Vol. II, p. 666) affirming the decree of the District Court in this cause.

On September 11, 1928, your petitioner filed a petition for a rehearing in the Circuit Court of Appeals for the Ninth Circuit. Said petition for rehearing was denied on October 1, 1928 (R., Vol. II, p. 680).

The Circuit Court of Appeals for the Ninth Circuit not only held the McMichael patent to be invalid but, in arriving at such conclusion, has conflicted with the Circuit Court of Appeals for the Second Circuit in its appraisal of what is in fact the essence of the McMichael invention, in its interpretation, and the significance by it attached to the prior art structures involved, and in its application of legal principles to the facts presented.

The Smith patent of 1872, which is the first patent cited against McMichael by the Ninth Circuit Court of Appeals, was carefully considered and found not an anticipation of McMichael by the Circuit Court of Appeals for the Second Circuit in the suit of your petitioner versus Powers-Kennedy Contracting Corporation *et al.*

The other prior art (actual and alleged) which was considered by the Circuit Court of Appeals for the Ninth Circuit in its opinion is not in any sense different in *kind* from the prior art which was before the Circuit Court of Appeals for the Second Circuit in the suits of your petitioner versus Ulen Contracting Corporation *et al.*, and Powers-Kennedy Contracting Corporation *et al.*

THE PROCEEDINGS IN THE SECOND CIRCUIT CASES.[1]

Concrete Mixing & Conveying Company v. Ulen Contracting Corporation et al.

On May 9, 1923, your petitioner filed its bill of complaint in the United States District Court for the Southern District of New York, charging Ulen Contracting Corporation with infringement of the McMichael patent aforesaid. The defendant in its answer set up the various defenses usual in patent cases—among others a defense based upon the file-wrapper of the application for the patent in suit. On motion of the defendant said last mentioned defense was segregated and tried separately before his Honor Learned Hand, then District Judge, who, on October 13, 1923, filed an opinion overruling such defense. Said opinion appears in the record herein (Exhibit Book, p. 13) and is reproduced in the following "Appendix" as "Exhibit A."

Subsequently Shandaken Tunnel Corporation was made a defendant in said suit and filed its answer in due course.

On August 20, 1925, after a full trial on the merits, his Honor Augustus N. Hand, District Judge, filed an opinion finding the McMichael patent valid and infringed as to all of the claims involved in the suit. A decree pursuant to said opinion was duly entered on August 20, 1925. The opinion of his Honor Judge Augustus N. Hand appears in the record herein (Exhibit Book, p. 18) and is reproduced in the "Appendix" hereto as "Exhibit B." The decree entered pursuant to said opinion is set forth in full in the hereinafter mentioned order of affirmance by the Circuit Court of Appeals for the Second Circuit.

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1 The opinions and decrees in the Second Circuit cases are all reproduced in the "Appendix" to the brief accompanying this petition.

The defendants, Ulen Contracting Corporation *et al.*, prosecuted an appeal from said decree of August 20, 1925, to the Circuit Court of Appeals for the Second Circuit. On May 3, 1926, said Court of Appeals, after consideration of the briefs and arguments of counsel, affirmed said decree *per curiam* (12 Fed. (2) 931). The order of affirmance by the Court of Appeals for the Second Circuit appears in the record herein (Exhibit Book, p. 25) and is reproduced in the following "Appendix" as "Exhibit C."

Concrete Mixing & Conveying Company v. Powers-Kennedy Contracting Corporation et al.

On or about November 28, 1924, your petitioner filed its bill of complaint in the United States District Court for the Southern District of New York, charging Powers-Kennedy Contracting Corporation and Anthony G. Fleck with infringement of the McMichael patent aforesaid. In due course the cause came on for trial before the Honorable Augustus N. Hand, District Judge, who, on November 8, 1926, after a full trial on the merits, found the McMichael patent valid and infringed. His opinion appears in the record herein (Exhibit Book, p. 30) and is reproduced in the following "Appendix" as "Exhibit D." An interlocutory decree pursuant to said opinion was entered in said cause on November 11, 1926, a copy of said interlocutory decree being certified to your Honors and the same being reproduced in the following "Appendix" as "Exhibit E." On March 19, 1927, the Honorable John C. Knox, District Judge, entered a final decree in said cause, pursuant to said interlocutory decree and a stipulation to said final decree annexed. The stipulation dispensed with an accounting and specified that plaintiff

should recover $21,000.00 from defendants if plaintiff should prevail in the Court of Appeals. Copies of said final decree and said annexed stipulation are certified to your Honors and are reproduced in the "Appendix" hereto as "Exhibit F."

The defendants, Powers-Kennedy Contracting Corporation *et al.*, prosecuted an appeal from said final decree to the Circuit Court of Appeals for the Second Circuit. Said Circuit Court of Appeals for the Second Circuit, after consideration of the cause and the arguments and briefs of counsel, on July 17, 1928, rendered an opinion affirming said final decree of March 19, 1927 (27 Fed. (2) 668). A copy of said opinion of the Circuit Court of Appeals for the Second Circuit is certified to your Honors, and the same is reproduced in the "Appendix" hereto as "Exhibit G."

Said opinion of the Circuit Court of Appeals for the Second Circuit not only reaches a conclusion diametrically opposed to that of the Circuit Court of Appeals for the Ninth Circuit in the instant case, but conflicts with the opinion of the Circuit Court of Appeals for the Ninth Circuit upon practically every important question involved in these suits under the McMichael patent.

REASONS FOR THE ISSUANCE OF THE WRIT.

1. By reason of the conflicting decisions of the Courts of Appeals for the Second and Ninth Circuits, your petitioner stands in the anomalous position of owning a patent which is valid in the Second Circuit, where your petitioner can secure relief against infringers, but is invalid in the Ninth Circuit, where your petitioner can secure no relief.

2. The conflicting decisions of the Courts of Appeals for the Second and Ninth Circuits confront many widely

distributed users of the machines embodying the subject-matter of the McMichael patent with a serious dilemma,—they do not know whether to respect the patent or to disregard it.

3. In the absence of an authoritative decision by your Honors settling the conflict between the Courts of Appeals for the Second and Ninth Circuits, great uncertainty and confusion will arise when the McMichael patent comes before the United States Courts in circuits other than those now in conflict,—due to the inclination of some judges to follow the judgment of the Second Circuit Court of Appeals and of others to follow the Ninth Circuit Court of Appeals.

4. It is apparent that either the Circuit Court of Appeals for the Second Circuit, or the Circuit Court of Appeals for the Ninth Circuit, has incorrectly interpreted the decision of the Supreme Court in the case of *Concrete Appliances Co.* v. *Gomery,* 269 U. S. 177.

5. The decision of the Court of Appeals for the Ninth Circuit in holding the alleged prior invention and use by Thomas Leake established by the testimony of one witness, given more than twenty years after the alleged event, and unsupported by the testimony of any other witness or by any contemporary device or document, is in conflict with many decisions of the Supreme Court, including particularly the following:

Deering v. *Winona Harvester Works,* 155 U. S. 286, 300.

Eibel Process Co. v. *Minnesota & Ontario Paper Co.,* 261 U. S. 45, 60.

T. H. Symington Company v. *National Malleable Castings Company et al.,* 250 U. S. 383, 386.

6. The acceptance as evidence by the Circuit Court of Appeals for the Ninth Circuit of certain state-

ments from Leake's preliminary statement, executed long after McMichael's filing date, and of certain argumentative statements also made long after McMichael's filing date by Leake's *attorney,* not called as a witness, is contrary to the commonly recognized rules of evidence, and in direct conflict with the decision of the Circuit Court of Appeals for the Second Circuit in the case of *General Electric Co.* v. *P. R. Mallory & Co.,* 298 Fed. 579, 586.

7. The subject-matter of the McMichael patent is of great public interest and importance,—being the means now used practically to the exclusion of all others for placing concrete linings in tunnels, subways and similar engineering projects.

It is respectfully submitted that a writ of certiorari should issue.

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BRIEF IN SUPPORT OF PETITION.

Statement.

The pneumatic concrete placing machine of the McMichael patent is itself a matter of great public importance,—being used, practically to the exclusion of all other means, for placing concrete linings in tunnels, subways and similar engineering projects.

The machine which was held to infringe the McMichael patent in suit of your petitioner versus Ulen Contracting Corporation *et al.*, was used in constructing the Shandaken tunnel which furnishes water supply to the City of New York, whereas the machine which was held to infringe in the suit of your petitioner versus Powers-Kennedy Contracting Corporation *et al.*, was used in constructing one of the units of the New York subway system. In the instant case respondents' (defendants') machine was used in lining one of the great two-mile tunnels forming part of the Skagit River project of the City of Seattle. The McMichael machine, as made by your petitioner and its licensees, has been and is being used on numerous important enterprises.

Prior to McMichael's invention, tunnels, subways, etc., were lined with concrete by the slow and expensive method of hand shoveling and tamping concrete behind the forms. McMichael produced an apparatus which, by the application of air to concrete in a very particular way, shoots it through pipes to and behind the tunnel forms and does this *without separating the rock, sand and cement constituting the aggregates of the concrete.* This was a truly remarkable accomplishment, and one theretofore thought to be impossible by persons familiar with the characteristics of concrete.

McMichael accomplished that which seemed impossible, by a machine of extremely simple construction, characterized by the employment of pressure on the mass of concrete in a vessel in combination with a *nozzle* so located as to discharge a high velocity jet of air into the concrete at the very place where it passes (under pressure exerted upon the mass) from the tapering walls or hopper of the container into the discharge conduit. While other characteristics of McMichael's machine are necessary and are, therefore, important, this high velocity nozzle, located precisely as stated, and acting on the mass compressed in the narrow outlet, is the most important element of McMichael's machine, and is the one which, above all others, is emphasized in his specification and claims.

Due to its location and the rapidity of its functioning, it is difficult to establish just why this nozzle, when applied as taught by McMichael, will make a practical success of a machine which, if not provided with such nozzle, would be an abject failure.

In the several suits involving the McMichael patent there has been considerable discussion and difference of opinion as to the precise reasons why the velocity nozzle is such an essential and effective element in McMichael's combination and why the respondents in the instant case, like the defendants in the Second Circuit cases, were willing to subject themselves to the annoyance and expense of litigation rather than to try to place concrete pneumatically with an apparatus not embodying this essential feature.

Courts and counsel and experts may differ as to the precise reasons why the nozzle, located exactly as taught and claimed by McMichael, is such an essential element of these pneumatic concrete placing machines and is *always* used. But there is no escape from the proposition that the nozzle and its location and relation to the

mass under pressure are of the essence of McMichael's invention, and are responsible for its practical success, and that the peculiar combination including the nozzle, precisely located as defined by the claims of the McMichael patent, is the real bone of contention in this case.

His Honor Judge A. N. Hand, and the Circuit Court of Appeals for the Second Circuit, fully appreciating the importance of the nozzle and its precise location and relation to the other agencies, found no difficulty in distinguishing the McMichael invention from the prior art.

The opinions of his Honor Judge Bourquin, and the Circuit Court of Appeals for the Ninth Circuit in the instant case, reveal a failure to appreciate that the nozzle, located in a very definite place, and acting in co-operation with the pressure behind the mass, is the thing which vitalizes the McMichael concrete placer and makes it a practical and generally used machine.

This failure by the Ninth Circuit Court of Appeals to appreciate the importance of the velocity nozzle, and the significance of its very definite location and relation to the static pressure on the mass, is very largely responsible for its conflict with the Second Circuit Court of Appeals.

Certainly if the Ninth Circuit Court of Appeals had perceived the importance of the nozzle, and the fact that it must be, and always is, placed precisely where taught by McMichael and *employed to act on the compressed mass,* it would have agreed with the Second Circuit Court of Appeals in saying of the Smith patent No. 122,498 of 1872: "It cannot be regarded as an anticipation."

Similarly, if the Ninth Circuit Court of Appeals had understood the significance of the nozzle in McMichael's very definite combination, it could not have attached any importance to the alleged 1905 experiment of Leake (which admittedly was devoid of any nozzle acting on a

mass of materials or otherwise) or to the British patents to Duckham, which disclosed devices totally incapable of handling concrete and which certainly failed to illustrate or describe anything corresponding to McMichael's very definitely located high velocity nozzle.

Furthermore, if the Ninth Circuit Court of Appeals had perceived the vital significance of McMichael's definite combination of pressure operated mass and propelling nozzle, it would have concluded, as did the Second Circuit Court of Appeals, that McMichael's machine is in fact and in contemplation of law a **new machine** operating by **pressure** and not by kinetic action, and thus radically distinguished from the Callahan device which was involved in the Supreme Court case of *Concrete Appliances Company* v. *Gomery*, 269 U. S. 177.

Judge Bourquin, after finding the claims of the McMichael patent invalid, held that they were not infringed by defendants' machines because of what he, Judge Bourquin, deemed to be limitations of the McMichael patent. The Ninth Circuit Court of Appeals disposed of the case on the issue of validity and did not go into the question of infringement. It is quite clear, however, that Judge Bourquin reached the conclusion that defendants' machines did not infringe, because he differed with the Courts of the Second Circuit as to the scope to be accorded the McMichael patent. In other words, Judge Bourquin's conclusion on the issue of infringement was reached not because of any substantial structural difference between the machines of the defendants in this case and the machines held to infringe in the Ulen and Powers-Kennedy cases, but to the contrary found non-infringement because he (Judge Bourquin) was disposed to read into McMichael's claims limitations which they do not contain—limitations which Judge A. N. Hand and the Second Circuit Court of Appeals did not find in McMichael's claims.

The Outstanding Conflicts Between the Two Courts of Appeals.

I. The conflicting conclusions as to the validity of the McMichael patent.

II. The conflict as to the pertinency of the prior art.

III. The conflict as to whether this case is controlled by or distinguished from the Supreme Court decision in the case of Concrete Appliances Co. v. Gomery.

IV. The conflict as to the proof required to establish prior invention and public use.

V. The conflict as to the anticipatory effect of discarded and abandoned experiments.

VI. The conflict as to what constitutes fair and competent evidence.

VII. The conflict as to the scope of the claims of the McMichael patent.

I.

The Conflicting Conclusions As to the Validity of the McMichael Patent.

Claims 2, 17, 34 and 35 of the McMichael patent were before both Courts of Appeals, being held valid by the Second Circuit Court of Appeals and invalid by the Ninth Circuit Court of Appeals.

In addition claims 4, 6, 21, 22 and 28 of the patent were before the Second Circuit Court of Appeals and claims 1, 18, 24 and 29 were before the Ninth Circuit Court of Appeals.

All claims before the Second Circuit Court of Appeals were held valid and all claims before the Ninth Circuit Court of Appeals were held invalid—due to diametrically opposed views concerning the salient features of McMichael's machine, the prior art and the legal principles applicable to the facts presented.

II.

The Conflict As to the Pertinency of the Prior Art.

The principal reference urged against the McMichael patent in both Courts of Appeals, in the suits decided during the present year, was the Smith patent No. 122,498 of 1872 (Exhibit Book, pp. 484-489).

Of the machine shown in the Smith patent, the Second Circuit Court of Appeals, in the Powers-Kennedy case, said:

> "In any event, it was very different from McMichael's device which injects air into the concrete at its entrance into the discharge outlet. It cannot be regarded as an anticipation."

Thus it appears that the Second Circuit Court of Appeals appreciated the significance and importance of McMichael's sub-mass engaging nozzle "which injects air into the concrete *at its entrance* into the discharge outlet" and, so doing, necessarily rejected the Smith patent as a reference against McMichael.

But the Ninth Circuit Court of Appeals emphasized the Smith patent by referring to it first of all of the prior art considered by it, saying:

> "The device (Smith) included all of the features of the appellant's patent *except the nozzle for admission of air near the point of exit.*" (Italics ours.)

This last quotation, when compared with the foregoing quotation from the decision of the Second Circuit Court of Appeals, contrasts the importance which the two courts attached to McMichael's peculiar nozzle and its very definite position. The Second Circuit Court of Appeals understood its vital importance. The Ninth Circuit Court of Appeals overlooked or discounted its importance, and as a result attached unwarranted impor-

tance to prior art which the Second Circuit Court of Appeals flatly rejected.

The alleged 1905 experiment of Leake (discussed by the Ninth Circuit Court of Appeals) is in the same category as the Smith patent. It purports to be represented by a sketch made by Leake in 1927 (Defendants' Exhibit No. 127, Exhibit Book, pp. 693, 694). Admittedly it had no nozzle or anything corresponding to it.

The Duckham British patents Nos. 4,400 of 1875 and 15,348 of 1885 (Exhibit Book, pp. 597-612) are not different in kind from prior art weighed and found wanting by Judge A. N. Hand and the Second Circuit Court of Appeals in the Ulen and Powers-Kennedy cases. These British patents show devices which are entirely incapable of handling concrete. Admittedly they fail to illustrate anything corresponding to McMichael's definitely located and definitely acting nozzle. The Ninth Circuit Court of Appeals, discounting or not preceiving the importance of McMichael's nozzle, attributes importance to certain statements in Duckham's specifications relating to certain *unillustrated* air and water nozzles for stirring up mud. But it is clear, we think, that the Second Circuit Court of Appeals would have rejected the Duckham patents, if before it, just as it rejected other similar and more relevant patents because failing to disclose the essential and vitalizing elements of McMichael's machine. For example, the patent to Prindle, 179,055, June 20, 1876, which was before the Second Circuit Court of Appeals in the Ulen case, discloses another dredging apparatus which is practically identical with Duckham.

III.

The Conflict As To Whether This Case Is Controlled By or Distinguished From the Supreme Court Decision in the Case of Concrete Appliances Co. v. Gomery.

The courts of the Second and Ninth Circuits are squarely opposed with reference to the question as to whether or not the above-mentioned Supreme Court decision controls or distinguishes from the facts in these suits under the McMichael patent.

The Second Circuit Court of Appeals, clearly perceiving that McMichael's was a *new machine*, because presenting a new combination which handled concrete as *no* material had ever been handled before, found no difficulty in distinguishing the character of the McMichael patent from the character of the Callahan patent involved in the Gomery case. The courts of the Ninth Circuit disagreed.

In deciding the Powers-Kennedy case the Second Circuit Court of Appeals said:

> "The Supreme Court case, however, contains nothing, in our opinion, which casts doubt upon the correctness of the Ulen decision; in fact, it was before us when that decision was made. . . . To do this (to reconstruct the prior art to accomplish McMichael's purpose) was to make a *new machine*, and one who thought of doing it would have had a new inventive idea, that is, that of blowing concrete, which had not been done before. When that is so the physical change in the apparatus need be very little to sustain a patent. . . . The Supreme Court case does not require us to reconsider the validity of McMichael's patent." (Italics ours.)

Diametrically opposed to the holding of the Second Circuit Court of Appeals that the McMichael invention is distinguished from the Supreme Court decision in the

Gomery case is Judge Bourquin's ruling in the present case:

> "The instant case cannot be distinguished in principle from *Concrete etc. Co.* v. *Gomery*, 269 U. S. 177, wherein it is held that appliances and method of conveying mobile substances by gravity extended to concrete when it came into use, and a subsequent patent to thus convey concrete is invalid."
>
> "For gravity, substitute compressed air, and that case 'reads' on this." (R., Vol. II, p. 616.)

And in its decision herein the Ninth Circuit Court of Appeals very evidently agrees with Judge Bourquin and disagrees with the Second Circuit Court of Appeals, for it cites the Gomery case in justification of its citation of the Duckham British patents against the McMichael patent,—the Duckham patents which were concerned with a problem entirely different from that of McMichael and which disclosed devices wholly lacking the McMichael structure and which, for many reasons, were totally incapable of handling concrete.

IV.

The Conflict As To the Proof Required to Establish Prior Invention and Public Use.

As previously pointed out, the alleged 1905 experiment of Leake admittedly lacked McMichael's essential high velocity nozzle and would not be anticipatory even if proved. But it certainly is not proved.

The contentions of respondents with reference to the alleged prior invention and use by Leake in 1905 of a non-existent structure illustrated by a sketch (Defendants' Exhibit No. 127) made by Leake on the witness stand in 1927, rests solely upon the deposition of Leake, uncorroborated by any other witness and unsupported by

any contemporary physical or documentary evidence of any kind.

The Ninth Circuit Court of Appeals has stated the startling conclusion that prior invention and use may be established by such evidence, and in so doing disregards the controlling Supreme Court decisions and conflicts with the decision of the Second Circuit Court of Appeals in the Powers-Kennedy case.

Judge Bourquin in supporting the contention that Leake was a prior inventor and user of the McMichael machine, said:

> "the evidence in quality and quantity inspires confidence and constrains conviction of the truth of the fact and beyond reasonable doubt." (R., Vol. II, p. 619.)

And the Ninth Circuit Court of Appeals approved Judge Bourquin's finding:

> "We find no ground for disturbing the trial court's conclusion."

Petitioner has been unable to find a single reported case where any patent has been held invalid by any court because of an alleged prior invention or use said to be established by the testimony of a single witness in the absence of corroborating contemporary physical or documentary evidence.

The cases cited by the Ninth Circuit Court of Appeals are not in point. Thus, for example, the Ninth Circuit Court of Appeals says:

> "That the testimony of one witness may be sufficient in such a case is held in *Mayer* v. *A. & H. G. Mutschler,* 248 Fed. 911, 914, where it was said that one witness may suffice if the surrounding circumstances are confirmatory."

That the said case of *Mayer* v. *Mutschler* is not in point is clearly revealed by a portion of the opinion therein, reading as follows:

"The rules as to prior use are severe and rightfully so and Archbald is a witness hostile to plaintiff; **but the existence of the machine is not denied,** its date of erection **proved by other testimony than Archbald,** as also is its unchanged condition, and still another witness swears that it was in 1911 as it is now."

It is clear that in *Mayer* v. *Mutschler* the patent in suit was not held invalid upon the basis of any such evidence as the uncorroborated deposition of Leake which is present in the instant case.

The Ninth Circuit Court of Appeals did not cite, and apparently overlooked, the following controlling Supreme Court cases which prescribe the kind and degree of proof necessary to establish prior invention and public use:

"As we have had occasion before to observe oral testimony, unsupported by patents or exhibits, tending to show prior use of a device regularly patented is, in the nature of the case, open to grave suspicion. The Barbed Wire Patent, 143 U. S. 275. Granting the witnesses to be of the highest character, and never so conscientious in their desire to tell only the truth, the possibility of their being mistaken as to the exact device used, which, though bearing a general resemblance to the one patented, may differ from it in the very particular which makes it patentable, are such as to render oral testimony peculiarly untrustworthy; particularly so if the testimony be taken after the lapse of years from the time the alleged anticipating device was used. If there be added to this a personal bias, or an incentive to color the testimony in the interest of the party calling the witness, to say nothing of downright perjury, its value is, of course, still more seriously impaired. **This case is an apt illustration of the wisdom of the rule requiring such anticipations to be proven by evidence so cogent as to leave no reasonable doubt in the mind of the court,** that the transaction occurred substantially as stated. The very exhibit produced by the witness Heller contradicted, so far as it could contradict, his testimony, and the witnesses who ought to have corroborated his story, gave a version which

showed it to be untrue in more than one important particular." *Deering* v. *Winona Harvester Works*, 155 U. S. 286, 300.

"It is true that some witnesses testify that they realized before Eibel's application that speeding up the stock to equal velocity with the wire would solve the difficulty and aid the speed. But there is not a single written record, letter or specification of prior date to Eibel's application that discloses any such discovery by anyone, or the use of the pitch of the wire to aid the speed of the machine. **The oral evidence on this point falls far short of being enough to overcome the presumption of novelty from the granting of the patent.** The temptation to remember in such cases and the ease with which honest witnesses can convince themselves after many years of having had a conception at the basis of a valuable patent, are well known in this branch of law, and have properly led to **a rule that evidence to prove prior discovery must be clear and satisfactory.**" *Eibel Process Co.* v. *Minnesota & Ontario Paper Co.*, 261 U. S. 45, 60 (1922).

"This court has pointed out that oral testimony tending to show prior invention as against existing letters patent is, in the absence of models, drawings, or kindred evidence, open to grave suspicion; particularly if the testimony be taken after the lapse of years from the time of the alleged invention. *Deering* v. *Winona Harvester Works*, 155 U. S. 286, 300." *T. H. Symington Company* v. *National Malleable Castings Company et al.*, 250 U. S. 383, 386.

In further contrast with the holding of the Ninth Circuit Court of Appeals that prior invention and use was established by the uncorroborated testimony of Leake, is the language of the Second Circuit Court of Appeals, in the Powers-Kennedy case, in rejecting an alleged prior public use to which *two* witnesses testified. The Second Circuit Court of Appeals said:

"This use was of a machine which Artingstall and Fanning said that they saw laying a concrete floor in 1903, subsequently changing the date to 1904. That was twenty-two years before they gave their

testimony, and there was no documentary corroboration of any kind. . . . If we may invalidate a patent upon such prior uses so proved, no patent would be safe. A prior use such as constitutes an anticipation was not proven with the degree of certainty which the courts require. See *Deering* v. *Winona Harvester Works,* 155 U. S. 286, 300; *Internat. Cork Co.* v. *New Process Cork Co.,* 6 F. (2) 420, 424 (C. C. A. 2); *De Laski & Thropp Co.* v. *Fisk Rubber Co.,* 203 F. 986 (C. C. A. 1)."

The holding by the Ninth Circuit Court of Appeals that prior invention and public use may be made out by the deposition of a single witness, uncorroborated by any other witness or by any contemporary physical or documentary evidence is in conflict with the decisions of the Supreme Court, is revolutionary in its nature, and if not corrected by your Honors will constitute a most dangerous precedent.

V.

The Conflict As to the Anticipatory Effect of Discarded and Abandoned Experiments.

The alleged 1905 experiment of Leake was unquestionably discarded and abandoned almost immediately after it was made.

Leake says:

"A. No; that was nothing but a crude machine put up there to see whether I could put concrete up in the air.

"Q. What happened after you used that?

"A. I tore it down.

"Q. Did you keep that?

"A. No. It was nothing only a lot of two by four stuff put in with hoops.

"Q. So that is not in existence now?

"A. Oh, no.

"Q. Do you know of any other pictures or blue-

prints of that device other than the one you have referred to here?[1]

"A. No." (R., Vol. II, p. 586.)

In striking contrast, the Second Circuit Court of Appeals in the Powers-Kennedy case says:

> "It is one thing to say that a continuous use to date may be found on oral testimony to have started at a given time, and quite another to say that such testimony is enough when it describes only a casual use, abandoned thereafter, and never entering into the art until after the patent in suit was applied for. . . . Such casual and abandoned uses do not contribute to the stock of knowledge which makes up the art. If we may invalidate a patent upon such prior uses so proved, no patent would be safe."

The language of the Second Circuit Court of Appeals is particularly applicable to Leake's alleged casual and abandoned experiment of 1905. Leake *after* McMichael's filing date did apply for a patent. Leake's patent application, however, was essentially different from his abandoned experiment of 1905. The patent application included McMichael's essential velocity nozzle. The alleged abandoned experiment of 1905 did not include that essential element. This, we think, was the salient reason why Leake's alleged 1905 experiment was an abandoned failure and why the world had to wait for McMichael to produce a practical pneumatic concrete placer.

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[1] The "one you have referred to here" is the sketch made by Leake himself in connection with his testimony in 1927 (Exhibit Book, pp. 693, 694).

VI.

The Conflict As To What Constitutes Fair and Competent Evidence.

The Ninth Circuit Court of Appeals, being unable to find a particle of *contemporary* documentary evidence to corroborate the testimony of Leake concerning his alleged prior use in 1905, quotes from a patent application of Leake, filed *after* McMichael's filing date, as supposed corroboration of Leake's testimony concerning events said to have happened *before* McMichael's filing date. McMichael's patent application was filed on January 14, 1907. Yet the Circuit Court of Appeals regards a preliminary statement (affidavit) made by Leake in *1908* as acceptable corroboration of Leake's testimony concerning events said to be have transpired in 1905. The preliminary statement was filed in an interference between Leake and McMichael. The interference terminated favorably to McMichael because petitioner, which owned both applications, concluded that McMichael and not Leake was the inventor of the essential combination including the high velocity nozzle. That the interference was properly terminated is demonstrated by the fact that Leake does not claim in his deposition in this case to have conceived anything corresponding to the high velocity nozzle before McMichael's filing date. Admittedly the 1905 experiment did not include it.

The only conceivable proper purpose to which the Leake preliminary statement could have been put in the present case would have been to impeach or discredit Leake as a witness. But as evidence to sustain the contention that Leake was a prior inventor, it is palpably incompetent. Originating *after* McMichael's filing date, it cannot establish events preceding McMichael's filing date.

Furthermore, the Ninth Circuit Court of Appeals regards certain statements made in Leake's patent application in 1908, by Leake's *attorney*, who does not even pretend to have had first-hand knowledge of the facts, as competent evidence corroborating the verbal testimony as to alleged happenings in 1905. The attorney was not called as a witness. These are simply laudatory statements made by the attorney in behalf of his client. All of this argumentative laudation is consistent with the fact that Leake made the apparatus of his patent application *after McMichael's filing date.* The attorney did not say when Leake's use of his patent application machine was made. Yet the Ninth Circuit Court of Appeals regards the laudatory statements made in 1908, after McMichael's filing date, as evidence that a device made in 1905 was practical and satisfactory.

There is no theory upon which the unsworn statements of Leake's patent attorney in an *ex parte* prosecution of a patent application can be considered competent evidence for or against either of the parties to this litigation.

In the Powers-Kennedy case the defendants attempted unsuccessfully to persuade the courts to give favorable consideration to the same kind of incompetent evidence which has been favorably considered by the Ninth Circuit Court of Appeals in this case.

The Second Circuit Court of Appeals said:

> "The new defense of prior use was held by the district court not sufficiently proved; and with this we agree. This use was of a machine which Artingstall and Fanning said that they saw laying a concrete floor in 1903, subsequently changing the date to 1904. That was twenty-two years before they gave their testimony, and there was no documentary corroboration of any kind. **It is true that in 1918 Artingstall described very generally before a meeting of engineers that this process was practiced in 1903,**

but that can not be deemed documentary corroboration."

That the Circuit Court of Appeals for the Second and Ninth Circuits are in disagreement as to the fairness and competency of the kind of evidence under consideration is even further emphasized by the following quotation from the decision of the Second Circuit Court of Appeals in the case of *General Electric Co.* v. *P. R. Mallory & Company,* 298 Fed. 579, 586, where we find pungently stated the rule which is supported by the great weight of authority:

> "The effort of what ought to be those very plastic regulations called rules of evidence is to produce testimonial matter relevant, competent, pertinent, material and fair, and of these adjectives emphasis is to be laid upon the last, quite as much as upon any of the others. It is *fair* to produce a man whose mental concept and reduction thereof to practice lies at the basis of a litigation, and subject him to the fiercest cross-examination, using his previous admissions and statements as the basis thereof; but anything more unfair than to introduce that man's statements *inter alios,* without the possibility of further examination, we cannot imagine.
>
> "The offer of various parts of the file-wrapper of the patent at bar, consisting of attorneys' arguments, statements or deductions, was flatly opposed to the rule so often stated in this circuit, and last restated in *Spalding* v. *Wanamaker,* 256 Fed. 530, 167 C. C. A. 602. To that ruling we adhere, and deem further discussion unnecessary."

VII.

The Conflict As to the Scope of the Claims of the McMichael Patent.

In his opinion Judge Bourquin (the trial judge), after holding that McMichael had not "discovered, invented, combined or made anything new" said:

> "That serves to dispose of the case, and the defense of non-infringement needs no more consideration than to note that Hackley's apparatus is a different combination than McMichael's, has no upright cylindrical hopper bottomed container, is without the U bend, employs no upper air save some incidental back pressure, does not discharge slug fashion as claimed is the invention of McMichael, and so, does not infringe." (R., Vol. II, p. 621.)

The quoted sentence sets forth propositions which are in conflict with the Second Circuit decisions involving the McMichael patent. The Ninth Circuit Court of Appeals, in reviewing Judge Bourquin, did not discuss the question of infringement.

Judge Bourquin's finding that Hackley's (defendants') apparatus does not infringe because it "has no upright cylindrical hopper bottomed container" is only another way of saying that McMichael's machine is no longer a McMichael machine if turned over on its side. A horizontal machine is in effect nothing more nor less than a McMichael machine of the vertical type turned on its side to save head room. Judge A. N. Hand and the Second Circuit Court of Appeals very definitely disagree with Judge Bourquin's finding that McMichael's claims do not extend to and cover a horizontal machine. The device which was found to infringe in the Ulen case was of the horizontal type.

When Judge Bourquin held the defendants' machines not to infringe the McMichael patent because being

"without the U bend" he was referring to a minor feature of construction to which McMichael's claims are *not* limited. That Judge A. N. Hand and the Second Circuit Court of Appeals do not agree that McMichael's patent is limited to a device including this U bend is demonstrated by the fact that defendants' devices in the Ulen and Powers-Kennedy cases were without this element.

When Judge Bourquin said that defendants' machines do not infringe because they "employ no upper air save some incidental back pressure" he was again conflicting with the findings of Judge A. N. Hand and the Second Circuit Court of Appeals in the Powers-Kennedy case. In the present case, as in the Powers-Kennedy case, the defendants urged that infringement was avoided because the air pressure above and behind the mass of concrete in the container was not established by an air pipe intended *solely* for that purpose. In each case the defendants claimed that the inevitable pressure above and behind the mass of concrete was "incidental back pressure." Judge A. N. Hand in the Powers-Kennedy case definitely decided this question in favor of the McMichael patent, as follows:

> "All of the claims were infringed until the Powers-Kennedy structure was impaired in the hope of avoiding infringement. After ceasing to introduce pressure behind the mass of concrete by means of closing the upper valve, it is true that some of the claims are not met, yet some of them are. There is undoubtedly a pressure behind the mass in defendant's machine far greater than ordinary air pressure and varying according to the freedom with which the air in the outlet tube is passing through it." (Exhibit Book, p. 31.)

That the Second Circuit Court of Appeals agreed with Judge Hand is clearly revealed by its opinion affirming his decree.

And when Judge Bourquin held that defendants' machines do not infringe because they do "not discharge slug fashion as claimed is the invention of McMichael" he was reading into McMichael's claims a limitation which they do not contain and which the Second Circuit Court of Appeals has said should not be read into them. The so-called "slug theory" is not included in the claims of the McMichael patent. It is only a theory which has been advanced in explanation of the incontrovertible fact that McMichael's definitely located and peculiarly functioning nozzle does enable these pneumatic concrete placers to transport concrete pneumatically (which would be impossible if it were either disintegrated or propelled in a body) and without separating its aggregates.

The Second Circuit Court of Appeals in the Powers-Kennedy case says:

> "The patent says nothing which commits the patentee to the slug method of operation. . . .
>
> "Moreover, several of the claims in suit are for the apparatus, or machine, and if they are infringed it is enough for the purposes of this suit, whether the machine discharges its concrete kinetically or in successive slugs. . . . But whether the concrete goes forward as we imagine, or in some other manner, there is no sufficient reason to suppose that defendants' machine does not operate in the same manner as plaintiff's, whatever that manner may be."

Summarizing:

It is the conclusion in the Ninth Circuit that McMichael's patent does not extend to a horizontal machine. The Second Circuit disagrees. It is the conclusion in the Ninth Circuit that McMichael's patent is limited to an apparatus including the "U bend." The Second Circuit disagrees. It is the conclusion in the Ninth Circuit that a machine does not infringe the McMichael patent if in such machine the pressure above and behind the mass of

concrete in the container is "back pressure." The Second Circuit disagrees. It is the conclusion in the Ninth Circuit that McMichael's claims are limited to a machine which discharges "slug fashion." The Second Circuit disagrees and holds that infringement is made out by showing the identity in structure between the device of the McMichael patent and a device charged to infringe,—that the devices which are of like construction operate in the same manner, whatever that manner may be.

The Facts Before the Two Circuit Courts of Appeals Were Substantially the Same in Every Essential Respect.

In only one single sentence does the opinion of the Court of Appeals for the Ninth Circuit allude to the four earlier decisions in the Second Circuit involving this same McMichael patent. This one sentence is as follows:

> "The decisions in *Concrete Mixing & Conveying Co.* v. *Ulen Contracting Corp.*, 12 Fed. (2) 929, and *Concrete Mixing & Conveying Co.* v. *The Powers-Kennedy Company*, relied upon by the appellant, were based on records widely different from that in the case at bar." (R., Vol. II, p. 678.)

This sentence may have been written in anticipation of a petition for a writ of certiorari, and in forehanded persuasion that it should be denied. This general assertion, however, is not supported by the citation of any wide or essential differences in the records of the several cases.

We say in reply to this general assertion merely that this statement contained in the opinion of the Ninth Circuit Court of Appeals is erroneous if it means anything more than the records are different in size and detail, due mainly to the astounding number of irrelevant prior art

patents and publications and cumulative depositions, offered in evidence by the respondent in this case. It could always be said of any two records in any two cases that they were "widely different,"—if regard be had only for immaterial detail.

The foregoing analysis of the conflicts between the two Circuit Courts of Appeal shows conclusively that the facts before the two courts were the same in every essential respect.

Conclusion.

In view of the foregoing, a writ of certiorari should issue.

Respectfully,

LYNN A. WILLIAMS,
CLIFFORD C. BRADBURY,
ALBERT G. MCCALEB,
Counsel for Petitioner.

STEPHEN J. COX,
Of Counsel.

APPENDIX.

OPINIONS AND CERTAIN DECREES OF THE COURTS OF THE SECOND CIRCUIT WITH WHICH THE NINTH CIRCUIT IS IN CONFLICT.

EXHIBIT "A."

Opinion of Honorable Learned Hand Overruling Segregated Defense—Ulen Case.

UNITED STATES DISTRICT COURT.

SOUTHERN DISTRICT OF NEW YORK.

Concrete Mixing and Conveying Company, *Plaintiff*,
against
Ulen Contracting Corporation, *Defendant*.
} E 26-325.

Sur motion by defendant to segregate and try separately a defense in the answer.

JAMES L. STEUART for the motion.

STEPHEN J. COX opposed.

LEARNED HAND, D. J.: The defendant moves under Rule Twenty-nine to try separately the defense contained in the seventh article of the answer which alleges (*a*) that the patentee had abandoned the claims eventually allowed before their allowance, (*b*) that the new claims had no support in a supplemental oath, (*c*) that the plaintiff is estopped to deny the invalidity of the claims, (*d*) that the disclosure contained an abandonment of the claims, (*e*) that the application having been once abandoned was irregularly renewed. The motion to try out the issues I allowed (though I think the practise of doubtful expediency usually), and I have heard it on the file-wrapper, and assignments on file, which is the only evidence that the defendant wishes to put in in support of the defence. I shall consider the several points in the order in which they are presented in the answer.

(*a*) This point rests upon a misconception of authorities like *Leggett* v. *Avery*, 101 U. S. 256, *Goodyear Dental Vulcanite Co.* v. *Davis*, 102 U. S. 222, and *Cartridge Co.* v. *Cartridge Co.*, 112 U. S. 624, on the one hand and *Shepard* v. *Corrigan*, 116 U. S. 593, *Corbin etc. Co.* v. *Eagle Lock Co.*, 150 U. S. 40 and *Hubbell* v. *U. S.*, 179 U. S. 77 on the other. The first doctrine is that on reissue no claims can be inserted which had been made and rejected in the original application. The second is that in the interpretation of claims a patentee may not insist that they shall be read as equivalent to claims in whose rejection in the Patent Office he acquiesced. Neither of these doctrines has anything at all to do with claims which have been once rejected and in substance resolicited and allowed while the application is still pending. So far as I know there is not a syllable in the books to support the notion that an applicant may not renew his claims as often as he pleases and persuade the examiner that he was wrong in his rejection. On principle that is clearly his right. The patent is *in fieri* until it is allowed; the proceedings, as Mr. Cox well puts it, are negotiations between two contracting parties, till their conclusion open to modification by either side. When the bargain is struck the patent issues and the claims are frozen, but not before.

(*b*) The next objection is the absence of a supplemental oath, but as the matter incorporated was only new claims and did not concern the disclosure, no such oath was necessary. It is now settled in this circuit that new claims do not require a supplemental oath, *Westinghouse etc. Co.* v. *Metropolitan Electric Mfg. Co.*, 290 Fed. Rep. 661 (C. C. A. 2).

(*c*) and (*d*). The third and fourth objections I consider together; they depend upon the supposed disclaimer contained in the disclosure. The patent is for an inven-

tion of transporting concrete pneumatically. Through one pipe air pressure is created on the surface of the concrete, through another there is a supplementary pressure added just at the point of discharge from the chamber to the transporting pipe. Each of the claims in suit except claim twenty-two contains as an element this second or auxiliary pipe which empties direct into the discharge duct. This differentiates the invention claimed from the methods of delivering concrete which are disclaimed as old in the passages cited. The earlier devices were generic of which the patent in suit was a species. The twenty-second claim has not this element but is distinguished from the old art as described in the disclaimer at least by the fact that the lines of pressure from the surface must extend direct into the discharge duct. The claim may be bad, it is true, but not because it is disclaimed in the patent.

(*e*) The last point is that the application was irregularly renewed after it had lapsed. The irregularities are (1) that the renewal was made in the name of the original applicant after he had conveyed, (2) that it did not adopt the original petition, and (3) that it "renewed" the application and did not pray for its renewal and that no hearing was had or evidence given that the delay was unavoidable. The title to the invention at the time of the petition to renew it was in a trustee for the benefit of four persons of whom one was McMichael, the original applicant, and the petitioner for renewal. Revised Statutes §4897 gives the right to apply for renewal to "any person who has an interest" in the invention. McMichael still had an interest and could apply.

The renewal petition adopted the "specifications, oath and drawings" theretofore filed. Apparently Patent Office Rule 176 says that the renewal application may

adopt these and the "petition" as well. How the renewal petition can adopt the lapsed petition I do not see; a new petition is required and it is a meaningless absurdity to require that it shall adopt the original petition.

The objection that the petition "renewed" the application instead of praying to renew it is frivolous. There is no evidence that the Patent Office gave no hearing to the renewal application and no case that I know which holds that the sufficiency of the evidence can be reviewed by a court.

The defense is overruled and a decree may pass striking it from the answer.

LEARNED HAND,
D. J.

October 13, 1923.

EXHIBIT "B."

Opinion of Honorable Augustus N. Hand at Final Hearing—Ulen Case.

No. 1094.

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

Concrete Mixing & Conveying Company,
Complainant,
vs.
Ulen Contracting Corporation and Shandaken Tunnel Corporation,
Defendants.

Stephen J. Cox, Solicitor for Complainant.
Stephen J. Cox and A. G. McCaleb, Counsel.
James L. Steuart, Solicitor and Counsel for Defendant, Ulen Contracting Corporation.
Frank S. Moore, Solicitor for Defendant, Shandaken Tunnel Corporation.
James L. Steuart, Counsel.

AUGUSTUS N. HAND, District Judge:

This is a suit for infringement of U. S. Letters Patent No. 1,127,660, to John H. McMichael, granted February 9th, 1915, Claims 2, 4, 6, 17, 21, 22, 28, 34 and 35.

The invention has for its object to provide a method of and apparatus for elevating and transporting concrete. The patentee describes concrete in the specification as "a composition containing relatively large pieces of rock or stone as uniform in size as possible, together with predetermined proportions of sand, cement and water."

Pneumatic pressure is used to compress the concrete into a restricted conduit pipe and then additional pressure by means of a jet of compressed air is applied to the mass near the entrance of the conduit pipe, thereby pushing the mass into and along the conduit. The McMichael invention is a most interesting one and has apparently met with general acceptance. Engineers at first distrusted the possibility of lifting and conveying concrete large distances by the McMichael device. The very material would be likely to clog any long pipe line. Moreover the weight would be so great if conveyed as a mass by means of pressure from the rear, that too great pressure for safety would be required, if, indeed, enough could be applied where the distance was long and concrete, as in some cases, was lifted eighty feet. Various attempts to convey sand appear in a number of patents, and in the Goldie Patent No. 707,840, sand was ejected under railroad ties by steam pressure.

In the Farnham Patent No. 747,396, there was a sandblast apparatus shown where the sand was carried into the discharge pipe by gravity aided by compressed air and then ejected by an air blast nozzle entering the discharge pipe in the general direction thereof. The patent to Sticker No. 758,118 is likewise for a sandblast.

None of these patents, in my opinion, would teach anyone with imagination and talents short of a real inventive faculty to instal a conveyor which would obviate the delay and expense of laying concrete by hand about the forms on which a tunnel is built. They were kinetic devices for floating light materials. This was in substance so even in the case of the Goldie patent where dry cement, or cement mixed with sand or gravel, was ejected from a short hose by an air or steam waterblast. It is not accomplished by a heavy air pressure as in the patent in suit, but by air or steam velocity.

In the McMichael patent the second blast of compressed air at once cuts the concrete mass and shoves along the segment of concrete. The segment to be shoved along is of comparatively small weight and dimension so that it can be carried without clogging the discharge pipe. Mr. Kirkland, the chief engineer of the complainant, described this at page 9 of the record:

> "Q. 42. What is the effect as you have observed the operation of the machine of working the jet at the bottom directed at a line or an angle to the travel of the material in passing from the main vessel?
>
> "A. The air breaks up or penetrates the mass as it goes toward the outlet, detaching portions of it, so that these portions will present a surface to the oncoming booster jet so that they may be forced through the pipe.
>
> "Q. 43. And are these batches solid or in detached portions?
>
> "A. They come on in waves. Sometimes the successive portions of each batch follow each other so rapidly through the pipe that to the casual observer it would be almost impossible to tell whether it was a continuous stream or successive batches, but in long pipe lines, the successive batches are more pronounced and one observing them will note a wave,—that the material comes in waves.
>
> "Q. 44. How far has concrete been conveyed and placed in this apparatus from the apparatus itself?
>
> "A. On the Twin Peaks tunnel in San Francisco we placed it at a distance of 4,900 feet from the machine."

Mr. Bateman, the superintendent of the well known contractors Booth & Flinn, confirmed the foregoing testimony as to the discharge of the concrete from the complainant's machine in sections.

Complainant's expert, Frederick Ray, said:

> "The net result of that is that it is possible to handle this concrete in slugs through a long pipe with a comparatively low pressure of air, that is a pressure of air around 100 pounds whereas to force it as

a continuous stream through such a pipe, might take thousands of pounds or it might even be impossible, but certainly concrete can be forced through a certain length of pipe." (Minutes, p. 91.)

Mr. Ray points out the portion of the specification which indicates that the inventor understood these advantages of his invention. McMichael says at page 2, lines 45 to 100 of the specification:

"It will be observed that the upper air pipe 8 serves merely to supply air to the upper part of the chamber 1, the pressure of the air being uniformly applied over the entire upper surface of the mass. The lower pipe 10, however, serves to direct a jet of air moving at a considerable velocity directly against portions of the mass as they move toward and into the discharge duct. The two pipes thus act in very different ways, the upper pipe supplying air which acts by pressure and the lower pipe supplying air which acts by velocity. On account of the presence of large and small particles, and on account of the presence of water, a mass of concrete forming materials (whether completely mixed or not) is relatively compact and impervious to air, and on this account the upper air body acts by applying a uniform pressure to the entire upper mass surface and without any substantial penetration of the air itself to the interior of the mass. Air from the lower pipe 10 may force itself into the body of the mass, and the relatively small air jet acting upon the relatively large stream of outward moving materials directly engages with the submasses to push them along. This action of the two air bodies in my apparatus is to be contrasted with the action of air in earlier devices which were so constructed that light materials such as grain or ashes could be caught in large moving air bodies and carried along in suspension with each particle separated from the others. One of the strongly marked and novel matters incident to this provision of the pipe 10 for introducing air directly into the discharge pipe, whether considered by itself or considered as supplemental to the agency such as the air from pipe 8 tending to effect down-

> ward and forced propulsion of the entire mass, is this, that the rapidly moving air from pipe 10 acts upon sub-masses, successively of the general mass, at points near those where they enter to delivery pipe, the result being that the thorough commingling of the ingredients (rock pieces, sand, cement and water) well understood by the engineer to be essential to a perfect concrete, can be attained with great rapidity and with a perfect, uniform, distribution of the various ingredients as concerns the relative positions of all component particles."

A device for transporting sand, ashes or coal even by means of an apparatus having a structural resemblance to complainant's device nearer than we find furnishes no anticipation of the patent and McMichael's conveyor when applied to concrete is not objectionable as a double use. *Concrete Appliance Co.* v. *Meinken,* 262 Fed. at p. 964. As Judge Denison remarked in the foregoing case:

> "Certainly the art of loading coal into a ship for fuel is not the same art as that of distributing wet concrete to a building structure; nor is the analogy very close." See also *Hobbs* v. *Beach,* 180 U. S. at p. 389.

The appreciation by the inventor of the necessity of limiting the concrete to be conveyed to sections of moderate size and weight and his method by the second air jet of securing the cutting off of a segment from the mass of concrete and a propulsion of this segment through the discharge pipe involves invention of a high order. His device has displaced all other methods for rapidly and economically conveying, lifting and placing concrete at long distances from the initial source of supply and has been used in numerous great enterprises. In such circumstances his claims should be read broadly and given a fair range of equivalents. When so read I think the defendants plainly infringe.

The process claims are limited to no particular form of apparatus so that the contention that they are for a mere function seems without merit. *Expanded Metal* v. *Bradford*, 214 U. S. 366; *Buffalo Forge Co.* v. *City of Buffalo*, 255 Fed. 83.

I find claims 2, 4, 6, 17, 21, 22, 28, 34 and 35 valid and infringed, and grant an interlocutory decree to the complainant with the usual reference.

A. N. H.

Aug. 4, 1925. *D. J.*

EXHIBIT "C."

Order of Affirmance by Circuit Court of Appeals for the Second Circuit—Ulen Case.

UNITED STATES OF AMERICA, ss.

The President of the United States of America: To the Honorable the Judges of the District Court of the United States for the Southern District of New York,

GREETING:

WHEREAS, lately in the District Court of the United States for the Southern District of New York, before you or some of you, in a cause between Concrete Mixing & Conveying Company and Ulen Contracting Corporation and another, a decree was entered in the office of the Clerk of said Court in the words and figures following to wit:

"This cause came on to be heard at this term, and was argued by counsel; and thereupon, upon consideration thereof, it was

ORDERED, ADJUDGED AND DECREED AS FOLLOWS:

1. That Letters Patent of the United States No. 1,127,669 granted to John H. McMichael February 9, 1915, for Method of and Apparatus for Transporting and Treating Concrete, the same being the letters patent in suit, are good and valid; that the said John H. McMichael was the original, first and sole inventor and discoverer of the improvements described and claimed in the said letters patent and set forth in the specification thereto annexed; that the plaintiff, the Concrete Mixing & Conveying Company, is the sole owner of said Letters Patent and is entitled to recover damages and profits for all infringements thereof; that the defendants Ulen Contracting Corporation and Shandaken Tunnel Corporation have infringed the said letters patent and particularly

claims 2, 4, 6, 17, 21, 22, 28, 34 and 35 thereof, and the exclusive rights of the plaintiff thereunder by using and employing a method and an apparatus for elevating and transporting concrete, practicing and embodying the invention of the said letters patent and the improvements patented as aforesaid, as charged in the bill of complaint herein.

2. That a perpetual injunction issue in this suit against the said defendants, restraining them, and each of them, their officers, agents, servants and employees, and all persons acting under or for them, from directly or indirectly making, selling, using or otherwise disposing of apparatus for elevating and transporting concrete or utilizing or practicing any method for elevating and transporting concrete embodying or realizing the invention or improvements of said letters patent No. 1,127,660.

3. That the plaintiff do recover of the defendants, the profits, gains and advantages which the said defendants, and each of them, have realized, or which have arisen or accrued to them on account of or in connection with the said infringement, and the damages resulting from said infringement.

4. That it be referred to William Parkin, Esq., of the City, County and State of New York, as Master *pro hac vice*, to ascertain, take and state and report to the court an account of the extent and circumstances of the use and employment of the said method and apparatus, embodying said invention and improvements as described in and secured by said letters patent No. 1,127,660, the number of such apparatus used and employed and the quantity of concrete placed by the defendants and each of them with such apparatus, and by the use or employment of it and the said method, and also the gains, profits and advantages which the said defendants and each of them has received or which have arisen or accrued to them, from the said infringement, and the damages which the plaintiff has suffered by reason of said infringement, the matter of the increase of damages, as prayed in the bill of complaint, to be left until the coming in of the said Master's report.

5. That the plaintiff on such accounting have the right to cause the examination of the defendants' officers, agents and employees, *ore tenus* or otherwise,

and also to the production of their books, records, accounts, vouchers and documents, and that they attend for such purpose, before said Master, from time to time, as said Master shall direct, and file with the said Master an account of the said profits, gains and advantages in detail, giving the items, dates and details and the extent of the use and employment of the said apparatus and method and the quantity and amount of concrete placed, the number of apparatus used, and the manner in which the same were used, and such other information relating thereto as said Master shall direct.

Dated August 20th, 1925.

AUGUSTUS N. HAND,
U. S. D. J."

as by the inspection of the transcript of the record of the said Court, which was brought into the United States Circuit Court of Appeals for the Second Circuit, by virtue of an appeal agreeably to the Act of Congress, in such case made and provided, fully and at large appear.

And, whereas, in the present term of October, in the year of our Lord one thousand nine hundred and twenty-five the said cause came on to be heard before the said Circuit Court of Appeals for the Second Circuit, on the said transcript of record, and was argued by counsel. On consideration whereof, it is hereby ORDERED, ADJUDGED AND DECREED that the decree of said District Court be and it is hereby affirmed with costs taxed at the sum of $25.00.

You, therefore, are commanded that such further proceeding be had in said cause, in accordance with the decree of this court as according to right and justice, and the laws of the United States, ought to be had, the said appeal notwithstanding.

WITNESS, the Honorable WILLIAM H. TAFT, Chief Justice of the United States, the 19th day of May, in the year of our Lord one thousand nine hundred and twenty six.

WM. PARKIN.
Clerk of the United States Circuit Court of Appeals, for the Second Circuit.

COSTS OF APPELLEE:

Clerk	$ 5.00
Printing record	
Attorney	20.00
	25.00

(Seal U. S. Circuit Court of Appeals, Second Circuit).
O. K.—C. E.
Filed Nov. 12, 1926.
A true copy.

ALEX GILCHRIST, JR.,
Clerk.

COST OF APPELLEE:—In No. 332.

Filing brief $5.00	5.00
Attorney's docket fee	20.00
	25.00

Teste: WM. PARKIN,
Clerk United States Circuit Court of Appeals, Second Circuit.
ALEX GILCHRIST, JR.,

A true copy.
(Seal)
Clerk.

EXHIBIT "D."

Opinion of Honorable Augustus N. Hand on Final Hearing—Powers-Kennedy Case.

#1177.

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

Concrete Mixing & Conveying Co., *Complainant,*
against
Powers-Kennedy Contracting Corporation and Anthony G. Fleck, *Defendants.*
} E 30/294.

Stephen J. Cox, Solicitor and Counsel for Complainant.
John D. Morgan, Solicitor for Defendants, John D. Morgan and Alan M. Johnson, Counsel.

AUGUSTUS N. HAND, District Judge:

This is an attempt to retry the issue determined in the case of *Concrete Mixing & Conveying Co.* v. *Ulen Contracting Corporation,* 12 Fed. (2d) 929, 931. The main reliance is upon a prior use which is alleged to have occurred over twenty years ago. No contemporary sketches are produced and the two witnesses attempt to describe from memory a mechanism which was not used except on two occasions. If such a practical device as that of the patent in suit had been employed, it is hardly likely that a contractor used to conducting large enterprises would not have sought a patent, or at least have taken advantage of something which in recent years has met with signal success. I am not satisfied that the defendants have established the prior use.

Aside from this new proof the defendants rely on the old contention made in the earlier case that their device is purely kinetic. I do not regard it as theoretically probable that masses of concrete containing gravel stones of a diameter running to one and a half inches can be blown long distances by compressed air and I think the testimony of Mr. Ray that he could detect the passage of a series of slugs when he put his ear to the outlet pipe is the more probable testimony. Moreover, if air were floating the concrete it would be bound to pass through the pipe and the pressure would be so rapidly reduced that the heavier portions would be left in the pipe.

All of the claims were infringed until the Powers-Kennedy structure was impaired in the hope of avoiding infringement. After ceasing to introduce pressure behind the mass of concrete by means of closing the upper valve, it is true that some of the claims are not met, yet some of them are. There is undoubtedly a pressure behind the mass in defendants' machine far greater than ordinary air pressure and varying according to the freedom with which the air in the outlet tube is passing through it. As each slug was discharged, the pressure in the discharge pipe would lessen and the pressure behind the mass amounting to something like thirty pounds would force a further slug into the outlet. If this were not so, the high pressure through the discharge pipe would hold back the concrete.

As for the point raised that patents for kinetic devices are pertinent prior art, it is answered by the fact that neither the patent in suit nor the defendants' device are kinetic in operation.

The complainant is entitled to an interlocutory decree with the usual reference, the same to be settled on notice.

A. N. Hand, D. J.

November 8, 1926.

EXHIBIT "E."

Interlocutory Decree—Powers-Kennedy Case.

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

Concrete Mixing & Conveying Co., *Complainant,*
vs.
Powers-Kennedy Contracting Corporation and Anthony G. Fleck, *Defendants.*
} Equity 30/294.

INTERLOCUTORY DECREE.

This cause came on to be heard at this term at final hearing on pleadings and proofs, and was argued by counsel for both parties; and now after due consideration thereof, it is Ordered, Adjudged and Decreed as Follows:

1. That the plaintiff is the sole and exclusive owner of United States Letters Patent No. 1,127,660 for Method of and Apparatus for Transporting and Treating Concrete, granted February 9th, 1915, to John H. McMichael, assignor to the plaintiff, the same being the letters patent in suit, and also of all claims and demands in law and in equity for any and every infringement thereof.

2. That the said Letters Patent No. 1,127,660 are good and valid in law, and particularly as to claims 2, 4, 6, 17, 21, 22, 28, 34 and 35 (plaintiff having voluntarily waived a decree under the other claims recited in the stipulation between the parties in which the claims relied on are specified), and that the said John H. McMichael was the original, first and sole inventor and discoverer of the improvements described and claimed in the said Letters Patent and set forth in the specification thereunto annexed.

3. That the defendants, Powers-Kennedy Contracting Corporation and Anthony G. Fleck have infringed the said Letters Patent and particularly claims 2, 4, 6, 17, 21, 22, 28, 34 and 35 thereof, and the exclusive rights of the plaintiff thereunder by making and causing to be made, and using apparatus and employing a method for elevating and transporting concrete embodying and practicing the invention of said Letters Patent and the improvements patented as aforesaid, as charged in the Bill of Complaint herein.

4. That a perpetual injunction issue in this suit against the said defendants, restraining them, and each of them, their officers, agents, servants and employees, and all persons acting under or for them, from directly or indirectly making, selling, using, or otherwise disposing of apparatus for elevating and transporting concrete or utilizing or practicing any method for elevating and transporting concrete embodying or realizing the invention or improvements of said letters patent No. 1,127,660.

5. That the plaintiff do recover of the defendants the profits, gains, and advantages which the said defendants, and each of them, have realized, or which have arisen or accrued to them on account of or in connection with the said infringement, and the damages resulting from the said infringement, together with the costs of this suit to be taxed.

6. That it be referred to William Parkin, of the City, County and State of New York, as Master *pro hac vice*, to ascertain, take and state and report to the court an account of the extent and circumstances of the manufacture, sale and use and employment of the said method and apparatus, embodying said invention and improvements as described in and secured by said Letters Patent No. 1,127,660, the number of such apparatus made, sold, used and employed and the quantity of

concrete placed by the defendants and each of them with such apparatus, and by the use or employment of it and the said method, and also the gains, profits and advantages which the said defendants and each of them has received or which have arisen or accrued to them, from the said infringement, and the damages which the plaintiff has suffered by reason of said infringement, the matter of the increase of damages, as prayed in the bill of complaint, to be left until the coming in of the said Master's report.

7. That the plaintiff on such accounting have the right to cause the examination of the defendant Fleck, and the officers, agents and employees of the corporate defendant *ore tenus* or otherwise, and also to the production of their books, records, accounts, vouchers and documents, and that they attend for such purpose, before said Master, from time to time, as said Master shall direct, and file with the said Master an account of the said profits, gains and advantages in detail, giving the items, dates and details and the extent of the manufacture, sale, use and employment of the said apparatus and method and the quantity and amount of concrete placed, the number of apparatus used, and the manner in which the same were used, and such other information relating thereto as said Master shall direct.

AUGUSTUS N. HAND,
U. S. D. J.

Dated:
November 11th, 1926.

EXHIBIT "F."

Final Decree and Annexed Stipulation—Powers-Kennedy Case.

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

Concrete Mixing & Conveying Co.,
Plaintiff,
vs.
Powers-Kennedy Contracting Corporation and Anthony G. Fleck,
Defendants.
} In Equity 30-294.

FINAL DECREE.

An interlocutory decree having been entered herein November 12th, 1926, adjudging Letters Patent in suit Nos. 1,127,660 valid and infringed as to claims 2, 4, 6, 17, 21, 22, 28, 34 and 35 thereof, directing the issuance of a perpetual injunction against the defendants for said infringement, awarding damages and profits to the plaintiff against the defendants for said infringement and costs, and directing an account of said profits and damages, and the parties hereto having waived further accounting proceedings and agreed upon the sum of Twenty-one thousand ($21,000) dollars as the amount of said costs and profits to be recovered by the plaintiff against the defendants and that a final decree for the same may be entered forthwith, as set forth in the annexed stipulation, filed and approved herewith, it is

ORDERED, ADJUDGED AND DECREED that the said defendants pay to the said plaintiff and the said plaintiff recover of the said defendants the said sum of Twenty-one thousand ($21,000) dollars, the amount of plaintiff's dam-

ages and defendants' profits, together with the costs of this suit to be taxed, and that the plaintiff have judgment and execution therefor against the defendants.

Dated March 19th, 1927.

KNOX,
U. S. D. J.

Approved as to form:

STEPHEN J. COX,
Plaintiff's Solicitor.

JOHN D. MORGAN,
ALAN M. JOHNSON,
Defendants' Solicitors.

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

Concrete Mixing & Conveying Co., *Plaintiff,*
vs.
Powers-Kennedy Contracting Corporation and Anthony G. Fleck, *Defendants.*
} In Equity 30-294.

STIPULATION.

1. IT IS HEREBY STIPULATED AND AGREED by and between the parties hereto through their respective counsel, that the plaintiff's damages and the defendants' profits, and the amount to be recovered by the plaintiff, which plaintiff is entitled to recover from the defendants herein, is and is hereby fixed at the sum of Twenty-one thousand ($21,000) dollars exclusive of costs; that the accounting proceedings herein before Wm. Parkin, Esq., Special Master, shall be terminated forthwith, and the said sum fixed as the amount which would have been awarded to the plaintiff on the said accounting by the said Master;

and that no further or other accounting shall be had herein, but that this stipulation and agreement shall be in lieu of any such accounting and any report or award and confirmation of the same by the court.

2. IT IS FURTHER STIPULATED AND AGREED that the plaintiff may enter a final decree herein in the usual form, a copy of which is hereto annexed, awarding it the said sum of Twenty-one thousand ($21,000) dollars as damages and profits to be recovered from the defendants, with costs to be taxed, and have judgment and execution therefor, with the same force and effect as if the said sum had been awarded by the Master and his award confirmed by the court, said decree to be entered forthwith; but that the defendants shall have thirty days from the entry of such decree within which to take an appeal therefrom to the United States Circuit Court of Appeals for the Second Circuit, and give the supersedeas bond herein provided for, but said appeal shall not question the amount of damages and profits.

3. IT IS FURTHER STIPULATED AND AGREED that the defendants shall within thirty days from the entry of the said decree take an appeal therefrom to the U. S. Circuit Court of Appeals for the Second Circuit, and shall as a condition prerequisite to the allowance of such appeal furnish, serve and secure the approval of a bond with sufficient surety in and for the said amount and sum of Twenty-one thousand ($21,000) dollars, to secure the payment of that amount and costs if the decision of the District Court herein is affirmed by said Court of Appeals in whole or in part, so that one or more of the claims of the patent in suit is found to be valid and infringed, said bond to act as a supersedeas bond until the Mandate of the said Court of Appeals is issued, and said amount, and any judgment that may be entered therefor in this suit to be paid, with interest from the date hereof, forthwith,

and the said bond to guarantee such payment. The right to appeal after said thirty days is hereby waived.

4. IT IS HEREBY STIPULATED AND AGREED by and between the parties hereto, through their respective counsel, that immediately upon the approval and filing of the aforesaid supersedeas bond for Twenty-one thousand ($21,000) dollars, interest and costs, plaintiff will without delay cooperate with defendant in securing an Order from the court, and otherwise properly moving, to release the attachment or other lien which plaintiff has caused to be filed with the Comptroller of the City of New York, against the moneys now due and payable to defendant upon its contract with the City of New York for the construction of the Forty-second Street Subway, the purpose being to release said moneys due defendant as soon as plaintiff is protected by the filing of the supersedeas bond.

Dated March 17, 1927.

STEPHEN J. COX,
Plaintiff's Solicitor.

JOHN D. MORGAN,
ALAN M. JOHNSON,
Defendants' Solicitors.

EXHIBIT "G."

Opinion of Circuit Court of Appeals for the Second Circuit—Powers-Kennedy Case.

UNITED STATES CIRCUIT COURT OF APPEALS

FOR THE SECOND CIRCUIT.

Concrete Mixing & Conveying Company,
Plaintiff-Appellee,
against
Powers-Kennedy Contracting Corporation and Anthony G. Fleck,
Defendants-Appellants.

Before: MANTON, L. HAND and SWAN, *Circuit Judges.*

Appeal from the District Court of the United States for the Southern District of New York.

Suit for infringement of claims Nos. 2, 4, 6, 17, 21, 22, 28, 34 and 35 of Patent No. 1,127,660 to McMichael, granted February 9, 1915, for "Methods of and Apparatus for Transporting and Treating Concrete." The defendant corporation was the builder of the Queensboro Crosstown Subway in Forty-second Street, New York City, and used in this work a machine for conveying and placing concrete by compressed air, which is alleged to infringe the patent in suit. The individual defendant furnished the machine to the corporation. From a decree finding the claims valid and infringed and awarding damages to the plaintiff, the defendants have appealed. Affirmed.

JOHN D. MORGAN,
Solicitor and of Counsel for Appellants.
ALAN M. JOHNSON,
Also of Counsel.
STEPHEN J. COX,
Solicitor and of Counsel for Appellee.
WILLIAMS, BRADBURY, MCCALEB & HINKLE,
of Counsel.

SWAN, Circuit Judge:

These same claims were held valid and infringed by the same district judge in *Concrete Mixing & Conveying Co.* v. *Ulen Contracting Corp.*, 12 F. (2d) 929. We affirmed that decree without opinion, *ibid*, 931. A detailed description of the patent in suit need not be here repeated. Subsequently, Judge Bourquin held the patent invalid in *Concrete Mixing & Conveying Co.* v. *R. C. Storrie & Co.*, 23 F. (2d) 131 (W. D. Wash.). It is urged that because of his decision and the case of *Concrete Appliance Co.* v. *Gomery*, 269 U. S. 177, as well as because of new matter introduced in this record, we should reconsider the validity of the patent.

The new matter is, of course, open to us and will be dealt with hereafter. The Supreme Court case, however, contains nothing, in our opinion, which casts doubt upon the correctness of the Ulen decision; in fact, it was before us when that decision was made. It holds, affirming the judgment of the Circuit Court of Appeals for the Third Circuit in 291 F. 486, that the Callahan patent, which covered an apparatus operating on the gravity principle for distributing "wet" concrete, was invalid, because it merely made use of known methods and appliances for the convenient handling of this recently accepted building material. The appellants' argument runs that since the Supreme Court emphasizes that old apparatus used for distributing water, grain, or coal was readily adaptable for handling concrete, so the prior art patents for blowing sand, grain or grout, which in the Ulen case were held not to invalidate McMichael's patent, should now be deemed complete anticipations of it. But the Gomery decision does not rest merely on the assumption that apparatus for coal and grain could have been used for wet concrete without inventive thought. Adaptations of old

carriers to handle concrete were shown to have been frequently made for several years before the application for the patent there in suit. The idea was already of common knowledge and was being applied generally. Therefore, Callahan's adaptation was not an invention. But that is a very different situation from the one before us in the Ulen case where nobody before McMichael had ever used a pneumatic apparatus to transport concrete. The Warren and Farnham sand-blast machines (Patents No. 671,303 and No. 747,396) could not have been so used without increasing the size of the discharge pipes and cutting off the sand-blast nozzles. To do this was to make a new machine, and one who thought of doing it would have had a new and inventive idea, that is, that of blowing concrete, which had not been done before. When that is so, the physical change in the apparatus need be very little to sustain a patent. The only reason why a new use is not patentable is that the law grants patents only for new things not for new ideas. Similarly, Goldie's machine (Patent No. 707,840) for blowing cement could not, so far as appears, have been used as it stood for concrete, and never was so used. The Supreme Court case does not require us to reconsider the validity of McMichael's patent.

In the suit against Storrie & Co., Judge Bourquin seems to have relied to some extent, at least, upon patents which were not in the record in the Ulen case and are not now before us. But whatever the court as now constituted might think of the correctness of our former ruling, it is our duty to follow it unless new evidence raises questions of the patent's validity not previously considered. See *Cortelyou* v. *Charles E. Johnson & Co.*, 145 F. 933, 934 (C. C. A. 2); *Crier* v. *Innes*, 170 F. 324 (C. C. A. 2).

The new evidence of the patent art upon which appellants rely to distinguish the Ulen decision includes two patents granted in 1872 to W. H. Smith, No. 122,497, is for an improvement in concrete pavements and claims concrete "prepared for use in a liquid or semi-liquid condition, capable of flowing in pipes and running into molds." No. 122,498 discloses a machine for mixing liquid concrete and conveying it by a discharge pipe from the mixer to the spot where it is to be laid. The concrete is to flow through the discharge pipe by gravity or, as an alternative, after flowing by gravity through a small winding passage into a chamber, F, is to be forced into the discharge pipe by the pressure of steam or compressed air admitted into the chamber above the mass of the concrete. The chamber has a flat bottom of large area relative to the size of the discharge pipe, the outlet of which opens into the center of the bottom. While this machine discloses the idea of forcing concrete through a pipe by compressed air, whether it was practically operable may be well doubted. It would seem that a large quantity of the concrete, or at least of the stones of which it is partly composed, would necessarily accumulate upon the flat bottom of the chamber. In any event, it was very different from McMichael's device which injects air into the concrete at its entrance into the discharge outlet. It cannot be regarded as an anticipation. Nor can the argument that the patent in suit is limited to "dry" concrete as distinguished from defendants' "wet" concrete prevail. It declares on page 3, line 55,

> "It is equally well adapted for the treating and handling of a mass containing a considerable excess of water in case such an excess is for any reason found desirable."

The other new references in the Patent Office (Canniff, McIlvrid, Beach and Davidson) we regard as less per-

suasive than those which were passed upon in the Ulen case.

The new defense of prior use was held by the district court not sufficiently proved; and with this we agree. This use was of a machine which Artingstall and Fanning said that they saw laying a concrete floor in 1903, subsequently changing the date to 1904. That was twenty-two years before they gave their testimony, and there was no documentary corroboration of any kind. It is true that in 1918 Artingstall described very generally before a meeting of engineers that this process was practiced in 1903, but that cannot be deemed documentary corroboration. Fanning says the machine was also used in one section of a tunnel in Chicago in 1903 and was apparently abandoned as too expensive. It is one thing to say that a continuous use to date may be found on oral testimony to have started at a given time, and quite another to say that such testimony is enough when it describes only a casual use, abandoned thereafter, and never entering into the art until after the patent in suit was applied for, an interval of nearly three years. Such casual and abandoned uses do not contribute to the stock of knowledge which makes up the art. If we may invalidate a patent upon such prior uses so proved, no patent would be safe. A prior use such as constitutes an anticipation was not proven with the degree of certainty which the courts require. See *Deering* v. *Winona Harvester Works*, 155 U. S. 186, 300; *Internat. Cork Co.* v. *New Process Cork Co.*, 6 F. (2d) 420, 424 (C. C. A. 2); *De Laski & Thropp Co.* v. *Fisk Rubber Co.*, 203 F. 986 (C. C. A. 1).

Much argument has been expended in an effort to establish just how the plaintiff's and defendants' machines operate in sending the concrete through the discharge pipe—the plaintiff contending that both discharge it in a succession of slugs or pistons, while the defendants claim

that both, or at least theirs, operate kinetically and float the materials in the air, just as sand or grain is carried in flotation. To us the dispute seems irrelevant. The patent says nothing which commits the patentee to the slug method of operation. The theory is built upon the use of the phrase "submasses," as in lines 72 and 89, page 2, where it is said that the lower air jet "engages with the submasses to push them along." But this cannot mean solid "slugs" for on the same page, lines 92-99, the effect is said to be thoroughly to commingle all the ingredients and insure a better mix. Again, at line 113, page 3: "The delivery pipe itself becomes a mixing chamber wherein pneumatic mixing is effected or continued"; and see also, line 86, page 3. Such statements necessarily forbid the notion of solid slugs. All that is meant by "submasses" is the portions that descend into the discharge pipe, 14, and by their descent are separated from the general mass in the main chamber, 1. It is a synonym for "portions of the mass as they move toward and into the discharge duct," line 53, page 2. Moreover, several of the claims in suit are for the apparatus or machine, and if they are infringed it is enough for the purposes of this suit whether the machine discharges its concrete kinetically or in successive slugs. Neither theory is entirely persuasive. Artingstall's opinion that the inner portion would be blown ahead of that at the circumference of the pipe which would be retarded by friction, seems sensible. On the other hand, it is difficult to believe that particles of the mixture, including stones of an inch and half in diameter, are floated independently in the air, as sand or grain is blown. Ray's testimony regarding the stones effectively disposes of that possibility under any such pressures as are used. It would seem to us that the mass as a whole must block the passage of air, forming an obstruction which yields at different

points because of its uneven power of resistance, and that the heavier stones must be carried by the impact and momentum and cohesion of the lighter substances, the whole mass going forward in a constantly agitated mixed stream, just as McMichael describes. But whether the concrete goes forward as we imagine or in some other manner, there is no sufficient reason to suppose that defendants' machine does not operate in the same manner as plaintiff's whatever that manner may be. The district court on conflicting evidence found infringement of the method claims (4 and 6) as well as of the apparatus claims. We are not convinced that this finding was wrong.

Apparently the "slug" theory was brought into the argument because it was thought necessary to distinguish in this way from Farnham, Warren and Goldie. We have already suggested that those machines would require modifications to operate with concrete containing stones, an inch and a half in diameter. Whether this was the ground adopted to distinguish them in the Ulen case, or whether the court as then constituted accepted the slug theory, does not appear and is not important. On some ground we distinguished the prior art and sustained the validity of the patent, and that ruling we should follow until its error is pointed out by higher authority.

It is urged that the defendants' structure and operation are different in that (1) they do not use "dry," air-impervious concrete, (2) they do not put compressed air pressure behind the concrete mass, (3) they do not use a second compressed air stream at the bottom of the chamber to break the dry concrete into slugs, and (4) they do not push the concrete through the delivery pipe in "slugs" by air pressure from behind.

We have already alluded to a portion of the specifications which indicates that the patent is not limited to "dry" concrete. It is true that the defendants' machine

in its present form, whether or not this was so when the suit was started, is operated without an air-inlet into the discharge chamber above the mass of concrete. But it is admitted by defendants' witnesses that as soon as air is injected into the discharge pipe, it is forced through the concrete and establishes a pressure in the chamber above. Mr. Ray, plaintiff's expert, testified that because of this the operation without the top air inlet is identically the same for all practical purposes as with the top inlet. While the claims which specify an upper air inlet (*e. g.*, claims 2, 17, 34 and 35) might not be infringed by a machine which omits it, the other claims in suit make no reference to the upper air inlet. We think there is clearly infringement of claims 4, 6, 21, 22 and 28. The final decree appealed from awards money damages and is sustainable on the infringement of these claims, even though other claims in suit were not infringed by the machine used by defendants at the time of the trial. The decree is accordingly affirmed. Manton, J., dissents.

A true copy,
WM. PARKIN,
Clerk.

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CHARLES ELMORE CRO
CL

IN THE

SUPREME COURT OF THE UNITED STATES

No. [redacted] 24

CONCRETE MIXING & CONVEYING COMPANY (a Corporation),
Plaintiff-Petitioner,

vs.

R. C. STORRIE & COMPANY (a Partnership),
Defendants-Respondents.

BRIEF FOR PLAINTIFF-PETITIONER.

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IN THE

SUPREME COURT OF THE UNITED STATES

No. 528.

CONCRETE MIXING & CONVEYING COMPANY (a Corporation),
Plaintiff-Petitioner,

vs.

R. C. STORRIE & COMPANY (a Partnership),
Defendants-Respondents.

BRIEF FOR PLAINTIFF-PETITIONER.

Statement.

This cause comes before your Honors by writ of certiorari.

The judgment to be reviewed is that of the Circuit Court of Appeals for the Ninth Circuit holding invalid the McMichael patent No. 1,127,660, granted February 9, 1915. The patent (Exhibit Book, p. 4) pertains to the pneumatic transporation and placement of concrete. The means of this patent is used, practically to the exclusion of all other devices, for placing concrete linings in tunnels and subways.

The opinion of the Ninth Circuit Court of Appeals (R.,

pp. 666-678) is reported at 27 Fed. (2) 838. The trial court opinion herein (R., pp. 610-622) is reported at 23 Fed. (2) 131.

The opinion of the Ninth Circuit Court of Appeals is in conflict with **two** prior decisions[1] of the Second Circuit Court of Appeals finding the McMichael patent valid, viz., *Concrete Mixing & Conveying Company* v. *Ulen Contracting Corporation et al.*, 12 Fed. (2) 929-931 (Circuit Judges Rogers, Hough and Mack), and *Concrete Mixing & Conveying Company* v. *Powers-Kennedy Contracting Corporation et al.*, 27 Fed. (2) 668 (Circuit Judges Manton, Learned Hand and Swan).

Plaintiff-petitioner, Concrete Mixing & Conveying Company, an Illinois corporation, the owner of the McMichael patent, has been engaged for many years, both directly and through its principal licensee Ransome Concrete Machinery Co., in the manufacture and distribution of pneumatic concrete placing machines embodying the McMichael invention (R., pp. 94 and 124).

Defendants-respondents, a partnership, having a place of business in the City of Seattle, are charged with infringement of claims 1, 2, 17, 18, 24, 29, 34 and 35 of the McMichael patent by the use, at the Skagit River Project of the City of Seattle, of machines like the one shown in the drawing, Plaintiff's Exhibit 13 (Exhibit Book, p. 84), and the one shown in the Hackley patent application drawing forming part of Plaintiff's Exhibit 12 (Exhibit Book, p. 74). The drawing, Exhibit 13, shows an early form of the respondents' (Hackley) machine as used at the Skagit River Project, whereas the Hackley patent application shows a later and slightly modified or improved machine which was used on the

---

1 The decisions of the Second Circuit Court of Appeals in the Ulen and Powers-Kennedy cases, and the trial court opinions in those cases are set forth in full in the "Appendix" to the petition for certiorari in the instant case.

same job. The two accused machines are substantially identical. They differ only with respect to the specific way in which the air pressure pipes enter the machine receptacle.

Lower Court Proceedings.

The proceedings of this case in the trial court and in the Ninth Circuit Court of Appeals are set forth at pages 6 and 7 of the petition for certiorari in this case.

The proceedings had in the trial courts and in the Second Circuit Court of Appeals in the cases of petitioner *vs.* Ulen Contracting Corporation *et al.*, and Powers-Kennedy Contracting Corporation *et al.*, are set forth at pages 8 to 10, inclusive, of the petition for certiorari herein.

Questions Presented.

The salient questions (as presented by the petition for certiorari) are:

1. Was the Circuit Court of Appeals for the Second Circuit right when, in the suits of your petitioner versus (1) Ulen Contracting Corporation *et al.*, and (2) Powers-Kennedy Contracting Corporation *et al.*, it found the McMichael patent[1] valid; **or**

Was the Circuit Court of Appeals for the Ninth Circuit

---

[1] Claims 2, 17, 34 and 35 of the patent were involved in each of the Courts of Appeals cases, being twice found valid by the Second Circuit Court of Appeals and being held invalid by the Ninth Circuit Court of Appeals. In addition claims 4, 6, 21, 22 and 28 were involved in the Second Circuit cases, and claims 1, 18, 24 and 29 in the Ninth Circuit case. *All claims before the Second Circuit Court of Appeals were held valid, and all claims before the Ninth Circuit Court of Appeals were held invalid.* The conflict between the two Courts of Appeals is fundamental, and is entirely independent of the fact that each of the Courts of Appeals had before it a few claims of the patent which did not happen to be before the other court—due chiefly, of course, to minor differences in the defendants' structures charged to infringe.

right when, in the present case, it held the McMichael patent to be invalid?

2. Was the Circuit Court of Appeals for the Second Circuit right in rejecting the Smith patent No. 122,498 of 1872 as a reference against the patent in suit, and in regarding the peculiar combination of static and velocity air pressure means, including the nozzle "which injects air into the concrete at its entrance into the discharge outlet" as distinguishing the McMichael invention from all prior devices not including such a combination and such a nozzle; **or**

Was the Circuit Court of Appeals for the Ninth Circuit right in finding the McMichael patent anticipated by,

(*a*) The Smith patent—*which admittedly discloses no such combination and no nozzle of any kind.*

(*b*) The alleged 1905 experiment of Thomas Leake—*which admittedly had no such combination and no nozzle of any kind,* and was supported only by a single uncorroborated and unsubstantiated deposition.

(*c*) The British Patents to Duckham Nos. 4,400 of 1875 and 15,348 of 1885—disclosing machines which for *many* reasons are structurally incapable of handling concrete, and which patents, while making passing reference to certain *unillustrated* air and water agitator nozzles for stirring mud, do not describe the *location* of any kind of a nozzle in the *position* required by the McMichael patent and which years of practical experience with McMichael's machine have demonstrated is essential to the success of a pneumatic placer of concrete?

3. Was the Circuit Court of Appeals for the Ninth Circuit right when it regarded your Honors' decision in

the case of *Concrete Appliances Co.* v. *Gomery*, 269 U. S. 177, as affording a basis upon which to hold the McMichael patent invalid; **or**

Was the Circuit Court of Appeals for the Second Circuit right when (in the Powers-Kennedy case) it distinguished the facts and principles in these suits involving the McMichael patent from the facts and legal principles involved in the Gomery case?

4. Was the Circuit Court of Appeals for the Ninth Circuit right in holding that the alleged prior invention and public use of McMichael's invention by one Thomas Leake was established by the verbal testimony of one witness, given more than twenty years after the alleged event and uncorroborated by any other witness, or by any contemporary device, drawing, photograph or other visible or tangible evidence; **or**

Was the Circuit Court of Appeals for the Second Circuit right when (in the Powers-Kennedy case) it applied the established rule of the Supreme Court, as set forth in *Deering* v. *Winona Harvester Works*, 155 U. S. 286, 300, and many other cases, that an alleged prior invention or public use to defeat an issued patent must be **"proven by evidence so cogent as to leave no reasonable doubt in the mind of the court"**?

5. Was the Circuit Court of Appeals for the Ninth Circuit justified in attaching importance to the alleged 1905 experiment of Thomas Leake, notwithstanding Leake's testimony that the experiment was **discarded and abandoned** immediately after it was made; **or**

Was the Circuit Court of Appeals for the Second Circuit right when (with reference to the alleged prior public use testified to by Artingstall *et al.* in the Powers-Kennedy case) it said:

"Such casual and abandoned uses do not contrib-

ute to the stock of knowledge which makes up the art. If we may invalidate a patent upon such prior uses so proved, no patent would be safe''?

6. Was the Circuit Court of Appeals for the Ninth Circuit justified in accepting as competent evidence, relative to the alleged prior invention and use by Thomas Leake, certain statements appearing in a Patent Office preliminary statement (*ex parte* affidavit) made by Leake more than a year after McMichael's filing date, and certain statements made more than a year after McMichael's filing date, in Leake's patent application, by Leake's *attorney* (not called as a witness) **or**

Is such evidence inadmissible because unfair and incompetent (as your petitioner contends), being the kind of unfair and incompetent evidence which was strongly condemned by the Circuit Court of Appeals for the Second Circuit in *General Electric Co.* v. *P. R. Mallory & Company*, 298 Fed. 579, 586?

7. Was Judge Bourquin (and inferentially the Ninth Circuit Court of Appeals) right in finding that defendants-respondents' machines do not infringe the McMichael patent; **or**

Was the Second Circuit Court of Appeals (and Judge A. N. Hand) right in finding the McMichael patent infringed by machines which are substantially the same as the machines used by the respondents in this case?

The Problem Which McMichael Solved.

Concrete is a mixture of rock, sand and cement with a varying quantity of water, preferably only sufficient water to wet the aggregates and hydrate the cement. It is approximately as heavy as solid rock, and when set forms artificial rock. These aggregates must be thoroughly mixed and proportioned, and the mixture must be

so intimate that each piece of rock and each particle of sand is thoroughly covered with cement. This intimate mixture must be so handled that the aggregates are in no way separated from each other between the point where they are mixed and the point where the concrete is ultimately placed.

Pneumatic conveyors were, of course, known before McMichael made his invention, but prior to the McMichael invention there was no pneumatic conveyor which in practice could successfully be used for transporting concrete, and there was no pneumatic conveyor which operated in accordance with the plan or principle which is characteristic of the McMichael machine and which is of the essence of the McMichael invention.

All of the pneumatic conveyors which were known prior to the McMichael invention fall into either one or the other of two generic classes. Firstly, there was that class of conveyor wherein the conveyed materials are carried along a conduit in suspension by the kinetic energy of an air stream. Secondly, there was that class of conveyors wherein air is applied to a liquid, or to a fluid mixture of a liquid and entrained solids, to cause the liquid or fluid mixture to flow as water flows through a hose or pipe or as tooth paste emanates from its collapsible container.

Neither of these well known old style types of conveyor was suitable for conveying concrete. If McMichael had merely attempted to convey concrete by utilizing one or the other of these old style types of conveyor which were known prior to his invention, his efforts to transport concrete pneumatically would have proved a failure and the lining of tunnels, subways and the like, would, in all probability, still be accomplished by the expensive and unsatisfactory hand methods which were in vogue prior to the advent of his invention.

Conveyors which cause the conveyed materials to be carried along in suspension by the kinetic energy of an air stream serve very well to transport materials such as grain, ashes, excavated materials, etc., where separation of the materials is a matter of no consequence, but such a conveyor would be worse than useless if applied to the transportation of concrete. It would cause separation of the rocks, sand, cement and water which constitute concrete, and would undo the thorough mixing which all engineers are agreed is absolutely essential to concrete. Moreover, the quantity and velocity of air required to hold such heavy materials as rocks in suspension would entail such an extravagance of power for the supply of compressed air as to render such a plan wholly uncommercial. With any available pressure and any practicable strength of conduit nothing would result but a piling up, a jamming and a plugging up of the entire apparatus.

A conveyor which causes a liquid, or a fluid mixture of liquid and entrained solids, to flow through a pipe is totally unsuitable for the conveyance of concrete, because of the characteristics of concrete. Concrete will not flow through a pipe; at least with any certainty. It is a mass of heavy solids, usually only moderately wet. It has an inherent tendency to bridge or arch[1] in contracting parts of the hopper and in the conduit itself, and thus to jam and block any conduit through which an attempt may be made to cause it to flow.

McMichael was confronted with the problem of conveying a material, concrete, which for very practical reasons, could not be carried in suspension in an air stream and which would almost invariably jam and clog in any

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1 By "bridging" or "arching" as these words are used in the record herein is meant the piling and wedging of pieces of rock against each other in such a way as to create a stoppage.

pipe through which an attempt might be made to *flow* it by pressure applied behind it.

We now know that the types of pneumatic conveyor known prior to McMichael were unsuitable for his purpose. McMichael is dead and, therefore, cannot tell his story as to the development of his invention, but it is clear that he discarded the old types of conveyor, if he ever attempted to use them, and resorted to a novel principle of operation which results from a definite arrangement of the various parts of his apparatus,—an arrangement which is clearly defined by the claims in suit and which has been followed in the respondents' (Hackley) machines.

To solve the problem of lifting, conveying and placing heavy concrete—sometimes called rock in the making—by air would seem to be sufficient to sustain any patent. To do this and keep the accurately and intimately mingled, yet uncombined, coarse and fine aggregates from separating, was evidently too great a problem for any engineer or inventor up to McMichael's time. Yet McMichael solved this problem in a manner so simple, complete and effective that now, many years after his application for patent, we find his invention in universal use and no other solution suggested.

The McMichael Apparatus.[1]

The McMichael apparatus involves:

(*a*) A closed chamber, in which a heavy mass of concrete forming materials may be placed, said chamber comprising a portion which gradually tapers or converges toward a discharge conduit;

(*b*) Means for establishing air pressure upon the

[1] The patent appears at Exhibit Book, page 4. Commercial forms of the McMichael apparatus are shown at Exhibit Book, pages 90 and 111.

mass of concrete within the chamber to crowd and pack it into the tapering portion of the chamber and toward the discharge conduit; **and**

(*c*) An air nozzle discharging **at the point where the mass packs**, due to the pressure behind the mass and the converging walls of the chamber, to detach or cut off slugs, or successive portions of the mass, and send them along the conduit *under pressure* without any substantial separation of the rocks, sand and cement constituting such slug or detached portion.

McMichael appreciated or ascertained that he could detach sub-masses or slugs from a compacted mass of concrete. He, therefore, provided his receptacle with a tapering portion anterior to the conduit and supplied air pressure to his receptacle behind the mass in order to crowd and pack the concrete into the tapering portion of the receptacle. The net result of the pressure behind the mass and the converging walls of the chamber is a compacted mass of concrete at the very beginning of the discharge conduit.

McMichael then did the thing which experience has demonstrated was a master stroke. **He applied a velocity jet of air to the concrete compacted at the point where the chamber merges into the conduit** so that the jet would successively detach portions or sub-masses of the compacted concrete and cause them to travel along the conduit as piston-like parcels, which do not suffer any substantial separation of the aggregates of which they are composed.

The location of the velocity jet at the very point where the concrete becomes compacted in passing from the chamber into the conduit is of the very essence of the McMichael invention. Regardless of whether or not respondents disagree, or pretend to disagree, with McMichael's explanation of the mode of operation of his

machine, they cannot seriously deny that the location of the velocity jet, precisely as McMichael located it, is absolutely essential in a machine which is to transport concrete successfully and without separating its aggregates.

The McMichael Apparatus Eliminates Hand Tamping and Insures Better Concrete Than Can Be Secured By Any Other Means. This Is One of the Reasons Why the McMichael Apparatus Is Used to the Exclusion of All Others in Tunnel Work.

Prior to the McMichael invention, tunnels were lined entirely by hand, that is, by shoveling the concrete to position behind the tunnel forms and then *tamping* the concrete so far as was possible, by projecting the end of a shovel, a stick or a tamping bar into the space between the forms and the rough wall of the tunnel.

Of course, it is practically impossible effectively to hand tamp concrete which has been placed behind tunnel forms. The walls of the tunnel, particularly when cut through rock as is customary, are jagged and literally filled with large and irregularly shaped crevices. It is impossible for a workman standing at the open end of a tunnel form, to tamp concrete into these irregular crevices. As a result, concrete, *as hand placed and hand tamped* prior to the McMichael invention was of uncertain density, frequently contained voids and never completely filled the crevices in the rough tunnel walls (R., p. 107).

The McMichael apparatus eliminates the necessity for hand tamping and insures the formation of a well packed, dense concrete, which completely fills the space between the forms and the rough wall of the tunnel, and which is projected under pressure into all of the crevices in the

tunnel wall. This is so because the McMichael apparatus delivers concrete to the forms with such *momentum* that the concrete is automatically packed much more effectively than could be accomplished by any amount of hand tamping.

The effectiveness with which the McMichael apparatus packs the concrete which it delivers is due almost entirely to the peculiar way in which the McMichael apparatus functions,—*i. e.*, by delivering the concrete in successive slugs or parcels which are projected behind the tunnel forms with great *momentum*,—the product of mass and velocity. No conveyor of the prior art,—whether it be one of the conveyors which caused the conveyed materials to be floated along by the kinetic energy of an air stream, or whether it be one of the conveyors which caused mixed and entrained solids to flow in a liquid, could possibly deliver any material with the *momentum* which enables the McMichael apparatus to form perfect concrete without any necessity for hand tamping. In this connection, the testimony of Mr. Kirkland (R., p. 107) is very instructive. Mr. Kirkland testified as follows:

> "Q. When the concrete is conveyed through the duct or conduit of the McMichael apparatus and reaches the form or the key of a tunnel arch in which the concrete is to be set, what is the effect of the discharge of that concrete upon the concrete itself—the quality and characteristics of the concrete?
>
> "A. The concrete, weighing perhaps a ton is discharged from the end of the pipe into a tunnel form where concrete has been previously put, and discharges into the previously placed concrete with such force, going perhaps 60 miles an hour that it gives it a tremendous shock so that the whole mass will quake and it makes a very dense mixture and packs it in solidly.
>
> "Q. How does concrete thus formed by the use of this method and apparatus compare in quality with

concrete formed by hand manipulation—put in place by hand and tamped by hand?

"A. Concrete tamped by hand is very likely to be porous whereas pneumatic concrete is very dense and fills up the spaces against the rock much more tightly than could possibly be done by hand; also in tunnels where there is timber used, it is necessary to pack in the concrete in all the vacant spaces. . . .

"Q. How far into a form can concrete be placed or thrown by hand processes and tamped?

"A. Just as far as a man can reach with a stick or shovel to tamp it with.

"Q. How far is that?

"A. A few feet—three or four feet.

"Q. How far can—is concrete carried from the end of the discharge duct of the McMichael apparatus to the place in the form at which it is to set?

"A. About 20 feet. The end of the pipe is usually carried to within 20 feet of the rear of the forms.

"Q. Is the pipe carried over the form and between the form and the rough interior of the excavated tunnel?

"A. Yes, sir."

The Slug Theory.

McMichael in his patent carefully pointed out what he believed to be the mode of operation of his machine. McMichael's explanation or "slug theory" as it has been called, has been recognized by the Patent Office, by engineers generally, and by the courts of the Second Circuit, as a very sound and logical explanation of why McMichael is able to transport heavy concrete by air through pipes, even for great distances, without separating the aggregates of which it is composed. It is the only theory ever advanced which is compatible with the accomplished fact that McMichael's machine does transport concrete by air without separating the aggregates thereof.

Of course, the respondents' counsel in this case, as did the defendants in the Second Circuit cases, scoff at the slug theory. But respondents do not, because they cannot, advance any counter theory which is reconcilable with the fact that machines embodying the McMichael invention (respondents' as well as petitioner's) do transport concrete by air without separating its aggregates.

In the appendix to this brief we have carefully considered the petitioner's tests which substantiate the slug theory and the test made by respondents which is said to disprove that theory. We think it abundantly appears that the slug theory is sound. The important thing to be borne in mind, however, is that McMichael does transport concrete by air without separating its aggregates. He does this because his apparatus operates differently from the conveyors of the prior art. He does this because of some peculiar way in which the several parts of his apparatus co-operate to prevent blocking and the separation of the aggregates. Respondents want to get and do get McMichael's result. *That is why they place their velocity nozzle exactly where McMichael taught that it should be placed* and that is why respondents utilize each and every other essential feature of McMichael's machine.

Even if McMichael, the Patent Office Examiners, eminent engineers and the Judges of the Second Circuit, were wrong as to the theory of operation of McMichael's machine, still respondents have used like apparatus, essentially different from any prior device, and accomplish the same result upon whatever principle or theory these like machines may operate.

The Second Circuit Court of Appeals, in deciding the Powers-Kennedy case, hit the nail on the head when, in referring to the dispute about the "slug theory," it said:

"To us the dispute seems irrelevant. The patent

says nothing which commits the patentee to the slug method of operation. . . . But whether the concrete goes forward as we imagine or in some other manner, there is no sufficient reason to suppose that defendants' machine does not operate in the same manner as plaintiff's whatever that manner may be." (27 Fed. (2) 670.)

The Patent Does Not Cover a Theory. The Correctness of the Inventor's Statement of the Theory of the Invention is Unimportant.

Assuming for the sake of the argument that the respondents contentions in regard to the so-called "slug theory" are correct and that the machine invented by McMichael does not in fact operate upon the theory that he thought it did, such a situation will not vitiate McMichael's patent. McMichael sought to arrive at a new result—that of conveying and placing concrete, without separation of its aggregates, by the use of compressed air. His patent discloses an operative machine which achieves the result sought. This is all that the law requires. The law does not require that the practical minded mechanic who invents a new machine shall know the complex and oftentimes obstruse theory upon which his machine operates.

McMichael would have been entitled to his patent had he never heard of the now controverted "slug theory." His patent does not and cannot cover a theory of operation. It must and does cover the *means* for arriving at a result. This being true, McMichael should not be deprived of the protection to which he is entitled under his patent merely because he, or his patent solicitor, was a man of sufficient intelligence to work out a reasonable hypothesis to explain the functionings of his machine. (And this is true even though his hypothesis may not have been the correct one.)

To hold that a patent is invalid because the inventor does not understand or misstates the theory of operation of his machine would result in invalidating a large part of all patents issued. To hold that a patent is invalid because of the inventor's faulty conception of the theory upon which his machine operates would mean that the theory and not the practical means of arriving at a result is the thing which is patentable. Indeed, this would be a peculiar construction of a statute which says that the things which are patentable are an "art, machine or manufacture." It is absurd to read into this statute the added fertile field of "theories." If patents are to be held invalid because of the inventor's erroneous conception of a theory of operation to explain his invention, then it follows that it is the theory which is patentable and any exponent of a new theory would be entitled to a patent for that theory itself, regardless of its practicability.

The Supreme Court has discussed this matter in its opinion in the case of *Diamond Rubber Company* v. *Consolidated Rubber Tire Co.*, 220 U. S. 428 (1910), where, on page 435 U. S., it is stated:

> "A patentee may be baldly empirical, seeing nothing beyond his experiments and the result; yet if he has added a new and valuable article to the world's utilities, he is entitled to the rank and protection of an inventor. **And how can it take from his merit that he may not know all of the forces which he has brought into operation? It is certainly not necessary that he understand or be able to state the scientific principles underlying his invention, and it is immaterial whether he can stand a successful examination as to the speculative ideas involved.** (Citing numerous authorities.) He must, indeed, make such disclosure and description of his invention that it may be put into practice. In this he must be clear. He must not put forth a puzzle for invention or experiment to solve, but the description is sufficient if

those skilled in the art can understand it. This satisfies the law, which only requires as a condition of its protection that the world be given something new and that the world be taught how to use it. It is no concern of the world whether the principle upon which the new construction acts be obvious or obscure, so that it inheres in the new construction."

The Commercial Success of the McMichael Apparatus.

The evidence herein shows that McMichael's apparatus revolutionized the art of placing concrete in tunnel linings, and, solely by reason of its great merit, has achieved remarkable commercial success in the hands of petitioner and its licensee, the Ransome Concrete Machinery Company.

Practically every tunnel of consequence constructed within recent years has been lined with the McMichael apparatus (R., pp. 101 and 103).

Kirkland, chief engineer of Concrete Mixing and Conveying Company, and Robinson, sales manager of the Ransome Company, testified concerning the many large tunnels in connection with which the McMichael apparatus has been or is being used (R., pp. 99 and 124) and each of these witnesses produced a list of the more important tunnel projects for which the Concrete Mixing and Conveying Company and the Ransome Company have furnished the McMichael apparatus (see lists, Exhibit Book, pp. 92 and 96).

Prior to the advent of the McMichael invention, tunnels were lined by hand. Concrete was shoveled and tamped by hand behind the tunnel forms. Progress was slow and expensive. The McMichael apparatus will line a tunnel in but a fraction of the time required for hand placement, and will do a much better job, because it carries the concrete to its final position with great momen-

tum and packs the concrete so tightly that hand tamping is not required.

The McMichael apparatus not only entirely displaced the former hand methods of concrete placement in tunnel linings and like situations, but in so doing, reduced the cost of placing it by one-third to one-half (R., p. 101).

All in all, the testimony in this case, as did the testimony in the Second Circuit cases, fully justifies the statement of Judge Augustus N. Hand, in his opinion in the Ulen case, that:

> "The McMichael invention is a most interesting one and has apparently met with general acceptance.
>
> . . .
>
> ". . . His device has displaced all other methods for rapidly and economically conveying, lifting and placing concrete at long distances from the initial source of supply, and has been used in numerous great enterprises." (12 Fed. (2) 931.)

The Great Success of the McMichael Machine in Practical Use Is Persuasive Evidence that McMichael Was An Inventor and Entitled to the Protection of the Patent Law.

The great practical value of the McMichael machine and the commercial success which it has achieved are very persuasive evidence that McMichael exercised invention in its production.

In the case of *Eibel Process Co.* v. *Minnesota & Ontario Paper Co.*, 261 U. S. 45, 56, 43 Sup. Ct. Rep. 322, this court, by Mr. Chief Justice Taft, said:

> "The fact that the Eibel pitch has thus been generally adopted in the paper making business, and that the daily product in paper making has thus been increased at least 20 per cent. over that which had been achieved before Eibel, is very weighty evidence to sustain the presumption from his patent that what he discovered and invented was new and useful."

And he also says:

> ". . . and the final fact that, when he made known his discovery, all adopted his remedy, leave no doubt in our minds that what he saw and did was not obvious, and did involve discovery and invention."

THE PATENT IN SUIT.[1]

The Patent Describes and Claims the Invention Fully and Accurately.

An understanding of the subject-matter of the McMichael patent can easily be arrived at by quoting some of its characteristic claims. Eight claims (1, 2, 17, 18, 24, 29, 34 and 35) are involved in suit. We shall quote but two of them.

Claim 2 reads as follows:

> "2. In combination, a chamber for containing concrete forming materials, a conduit leading therefrom, a compressed air inlet pipe connected to a part of the chamber remote from the conduit, and another compressed air inlet pipe leading through the chamber wall and terminating **within the chamber near the opening into the conduit** in a nozzle **directed toward** said opening."

Claim 17 (another of the claims in suit) refers more specifically to the peculiar construction and arrangement which produces the effect of detaching and delivering the mass in "*successive portions.*" It reads:

> "17. In a device for treating and moving a mass of concrete forming materials, the combination of a chamber for receiving and containing the said mass, a discharge duct connected with the chamber, an air inlet pipe connected with the chamber, means for preventing the flow of air or materials, out of the chamber except through the discharge duct, means for supplying air under pressure through the said

[1] The patent appears at page 4 of the Exhibit Book.

pipe to the chamber back of the mass of materials therein to push the said mass toward and into the discharge duct, and means for causing a jet of air to inpinge upon **successive portions** of the mass in the general direction of the discharge duct to directly assist their movement therethrough."

The material—concrete—to the handling of which the improvements are appropriated, and limited by the patent, is defined as follows (Spec., p. 2, lines 100-108):

"As is well known, the material referred to as concrete is a composition containing relatively large pieces of rock or stone, as uniform in size as possible, together with predetermined proportions of sand, cement and water. The purpose of this composition is, ultimately, to have, in a desired position, a hard rock-like body which will resist disintegration and fracture."

This material may be mixed in any desired proportions, and may be of any desired consistency, but one of the objects of the invention is to enable the user to use a *relatively stiff or "dry" concrete mixture,* in which a minimum of water is employed, as that has been considered the ideal mixture for many years. Thus the specification says (p. 3, lines 42-55):

"One of the important advantages incident to the use of a device embodying my invention is that this undesirable excess of water can be reduced to a minimum *or entirely eliminated,* satisfactory coating of the rock pieces being found to be possible when the binding material is *relatively stiff.* While an apparatus embodying my invention is *especially well adapted* for the handling of a mass of concrete forming elements containing *little* or *no* excess of water, it will be understood that its use is not limited to the handling of such a mass."

The operation of the invention is fully described in the specification, and particularly at page 2, lines 45-100, from which we quote in part:

"It will be observed that the upper air pipe 8

serves merely to supply air to the upper part of the chamber 1, the pressure of the air being uniformly applied over the entire upper surface of the mass. The lower pipe 10, however, serves to direct a jet of air moving at a considerable velocity directly against portions of the mass as they move toward and into the discharge duct. The two pipes thus act in very different ways, the upper pipe supplying air which acts by pressure and the lower pipe supplying air which acts by velocity. . . . Air from the lower pipe 10 may force itself into the body of the mass, and the relatively small air jet acting upon the relatively large stream of outward moving materials *directly engages with the sub-masses to push them along.*"

A further description of the construction and operation will be found elsewhere in the specification.

Referring to the drawing of the patent, 1 is the receiving chamber for the concrete, 2 the smooth, tapering portion leading to the outlet, 3 and 5 the charging opening and door respectively, 4 the head of the chamber, 6 an air reservoir, 7 the air compressor, 8 the pipe supplying compressed air near the top of the chamber and 9 the valve controlling it, 10 the air pipe for supplying the jet of air near the outlet of the chamber and 11 the valve controlling it, and 13 the discharge conduit.

In the embodiment shown in the patent, there is a small pipe 12 leading into the chamber for water, which "may be" used "as a lubricant" (Spec., p. 1, lines 99-102) and the discharge conduit has a U-bend 14 in it so that the concrete masses will be "more or less tightly packed" (Spec., p. 1, line 97), as they leave the chamber. Water is usually supplied before the concrete is placed in the chamber, and the U-bend is omitted in most cases, as the resistance of the discharge pipe has been found sufficient to pack the concrete. The bend, however, is still used by the petitioner in some cases (R., p. 122).

The conveying conduit shown in the patent extends up-

wardly, and in all or nearly all cases will extend upwardly more or less to reach the top of the tunnel or other work but it may extend entirely on a level (Spec., p. 4, line 82).

While the particular action of the invention in handling concrete is described in the patent and has been brought out fully in the testimony, to show that the invention involves a principle of operation **entirely its own**, the claims are not all limited to this precise mode of operation. **In a broad sense, the invention is characterized by the fact that it first reduces the concrete to a compact mass and then conveys and delivers it by combined pressure and nozzle action.** And it does this with relatively low air pressure, pressures of 80 to 100 lbs. per square inch being employed.

The Respondents' Apparatus Is a Complete Embodiment of the McMichael Invention and Is Operated in a Manner Which Fully Realizes All of the Advantages of the McMichael Invention.

The drawings opposite this page, show how completely the respondents have copied McMichael's invention.

The first drawing is taken from the McMichael patent. The second illustrates an early form of the respondents' apparatus which was used on the Skagit River job, and the third drawing, taken from the Hackley patent, shows a later machine also used by the respondents on the Skagit River job.

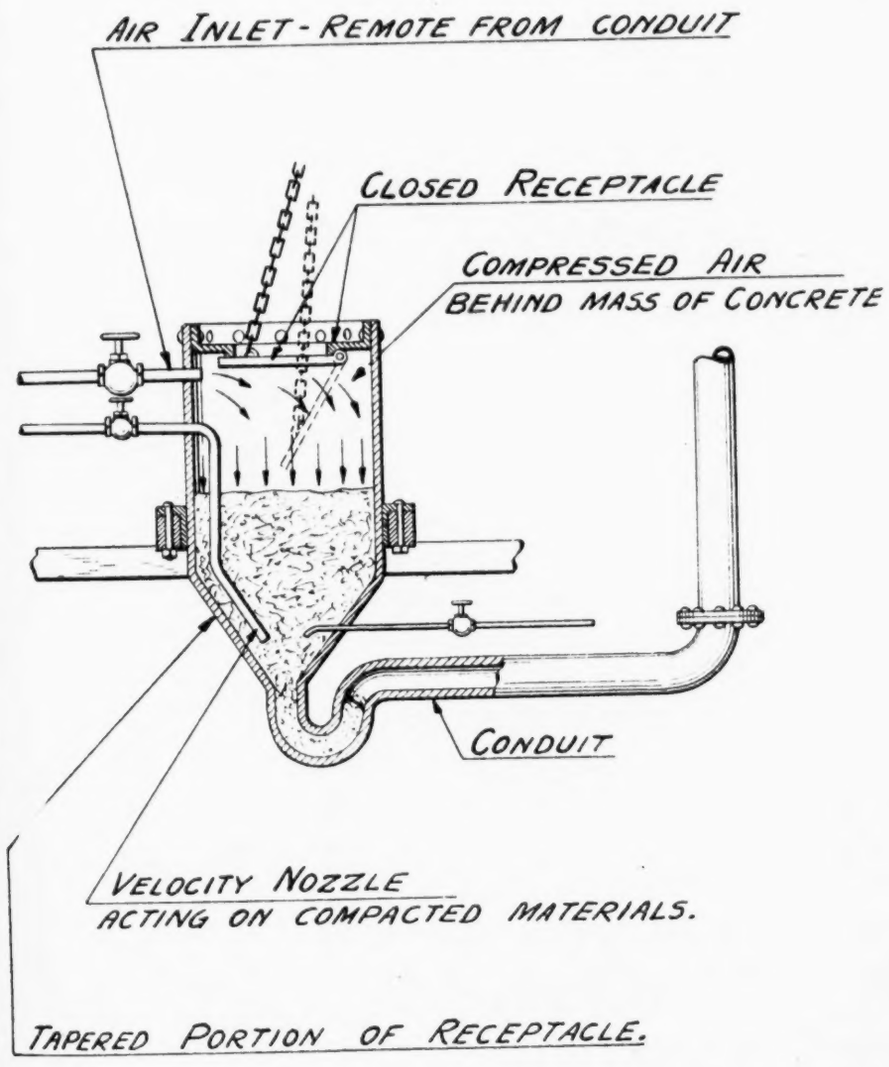
The apparatus of the patent is a "vertical" machine, whereas each of the respondents' machines is "horizontal." The horizontal type of machine is more convenient when the apparatus is used in tunnels having little head room. This form, along with the vertical type, is

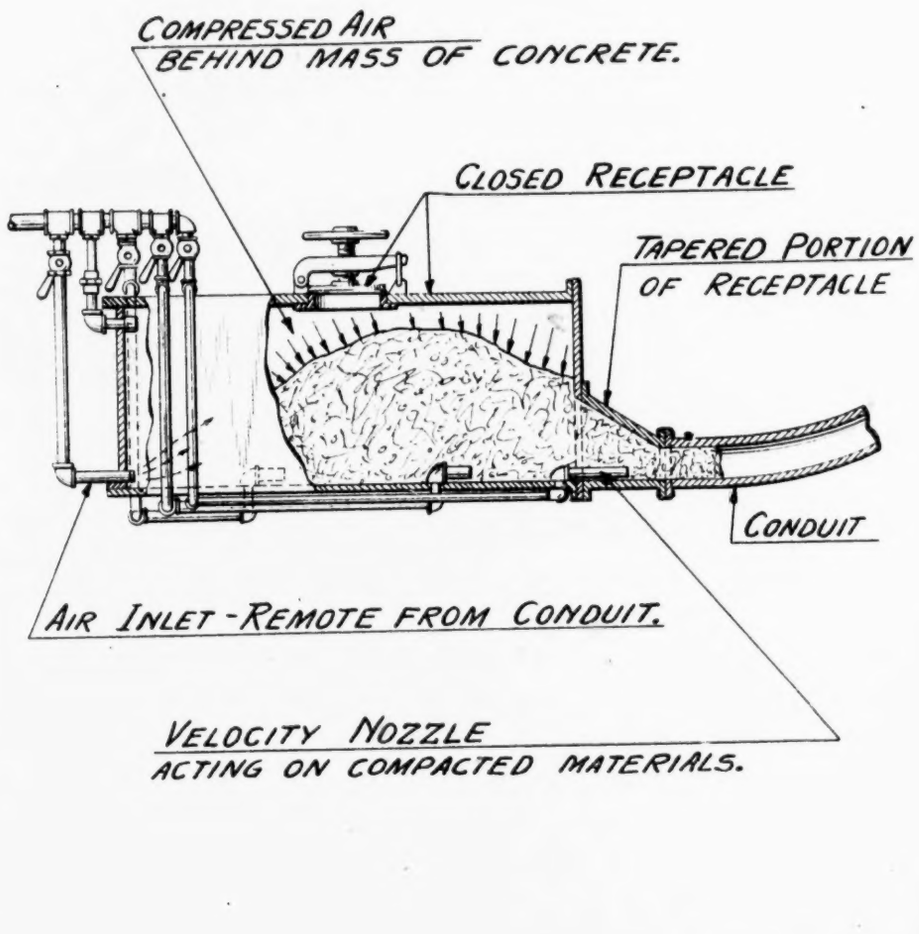
PATENT IN SUIT

RESPONDENTS'

I. THE MACHINE

OXENHAM SAW ON OCTOBER 10TH 1923
(RECORD P. 78)

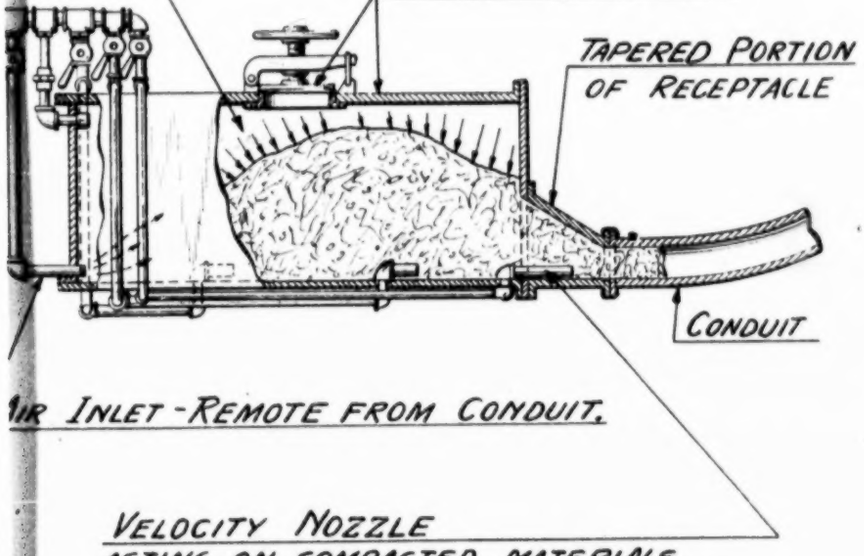




RESPONDENTS' APPARATUS.

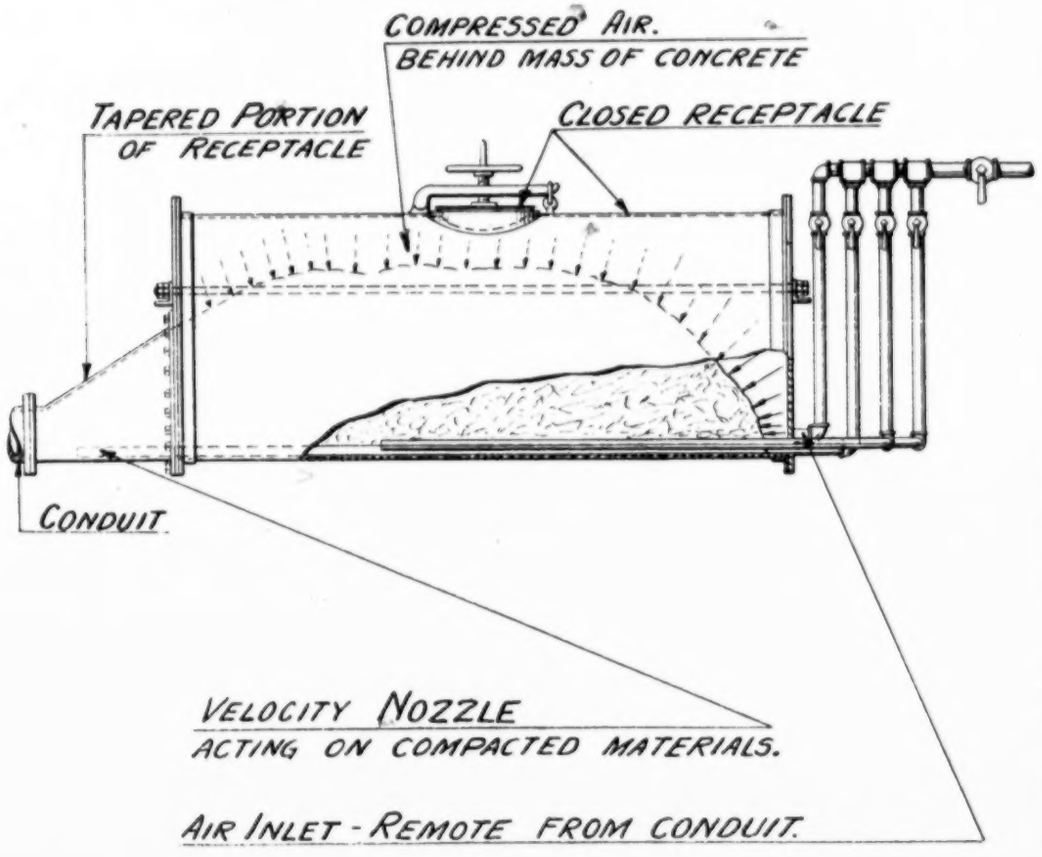
I. THE MACHINE

OXENHAM SAW ON OCTOBER 10TH 1923
(RECORD P. 78)



II. THE MACHINE

OF THE HACKLEY PATENT #1,619,297
(EXHIBIT BOOK P. 78)
ALSO USED BY RESPONDENTS
ON THE SKAGIT RIVER JOB.



also used by petitioner's licensee (see illustrations of Ransome Apparatus, Plaintiff's Exhibits Nos. 22 and 24—Exhibit Book, pp. 102 and 105). Furthermore, this "horizontal" type of machine is the kind of machine which Judge A. N. Hand, and the Circuit Court of Appeals for the Second Circuit, found to infringe the McMichael patent in the Ulen case (see drawing on page 181, Ulen R., Plaintiff's Exhibit 4).

It is perfectly obvious that, except for certain immaterial differences peculiar to the horizontal type, the respondents' (Hackley) machine is nothing more nor less than the device of the McMichael patent turned on its side.

Both the apparatus of the patent and respondents' apparatus comprise receptacles which converge or taper toward the discharge conduit. Each apparatus is provided with a sturdy door to permit the insertion of the concrete to be conveyed and to withstand the pressures which are created above and behind the mass of concrete when compressed air is admitted to the receptacle through the several compressed air pipes. *Each apparatus has a velocity nozzle disposed at the point which McMichael ascertained was the necessary point, i.e.,* the point at which the concrete is compacted, and where it tends to arch and jam, due to the influence of the pressure in the receptacle and its tapering walls. The devices are practically identical. As one operates so must the others.

It was suggested in the courts below that since in respondents' machines the air inlet pipes "remote from the conduit" are located in the lower part of the chamber, there might not be "pressure above the mass" of concrete in the chamber. It seems obvious, however, that air pressure must and does build up in the chamber, regardless of whether the air for this purpose is admitted at the top or at the bottom. Indeed, in the Powers-

Kennedy case, one of the machines used by the defendants relied solely upon air admitted through the velocity nozzle to build up a pressure above the mass of concrete in the chamber. Of this machine, Judge A. N. Hand in his opinion, correctly said:

> "There is undoubtedly a pressure behind the mass in defendants' machine far greater than ordinary air pressure and varying according to the freedom with which the air in the outlet tube is passing through it. . . . If this were not so, the high pressure through the discharge pipe would hold back the concrete." (Exhibit Book, p. 31.)

What Hackley, Respondents' Engineer, Said About the Identity of Respondents' Apparatus With That of McMichael.

If any reasonable doubt could exist as to the absolute similarity of the respondents' devices and that of the McMichael patent, the doubt would be dispelled by consideration of the very accurate description given of the respondents' (Hackley) machine by Mr. Roy C. Hackley at the time he made application for patent thereon. The drawing and specification as originally filed by Mr. Hackley in 1924 are in evidence as Plaintiff's Exhibit 12 (Exhibit Book, p. 32). Mr. Hackley, the designer of the respondents' machines, reviewed this original specification and its accompanying drawing when he took the stand in this case and testified that they properly describe and illustrate the machine which was used by the respondents at the Skagit River Project (R., pp. 72 and 73).

Mr. Hackley, in his said original patent specification, and in referring to the drawing accompanying it, says:

> "It consists of an elongated container which is substantially egg-shaped in cross-section, as shown

in Fig. 4. The container is provided with a filling opening through which each batch of concrete is delivered, and the opening is in turn provided with a closure, such as generally indicated at 30, **which is securely fastened when air under pressure is delivered to the interior of the container.** The forward end of the container is provided with a cone-shaped nozzle, as shown at 31, and this in turn flanged as indicated at 32, to permit the steel discharge-pipe to be connected thereto. **A smooth, continuous, uninterrupted passage is thus formed between the interior of the container and the discharge-pipe, and choking or blocking of the nozzle is thus prevented.**

"One of the air-pipes leads to the nozzle of the container, while the remaining pipes, indicated at 34, 35 and 36, terminate at intermediate points. They extend through the rear head and are extended to advanced position, the pipe 34 terminating **directly in the nozzle,**[1] the pipe 35 at a point approximately one-half of the length of the container, and so on. **The air discharging from the pipe 34 insures a pressure in the discharge-pipe, and it also applies air to the concrete at or near the point where it escapes from the main container.** This causes the mass of concrete to discharge with considerable velocity and to travel in the general direction of the discharge pipe. It furthermore insures agitation and mixing of the sand, cement and rock, and as such produces a uniform coating of the rock in the mixture. The air furthermore mixes with the concrete and as such prevents it from discharging as a solid mass. In fact, the concrete delivered to the container is advanced forwardly by the pressure exerted by the air discharging from the pipes indicated at 35 and 36, **but as the pipe 34 is disposed directly in the nozzle, the mass is broken up into portions which are driven ahead under high velocity by the jet of air discharging from the pipe 34,** this being of considerable importance, as it positively prevents choking or blocking up of the apparatus." (Exhibit Book, p. 44.) (Emphasis ours.)

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[1] "Nozzle" as here used means the tapering portion of the receptacle.

When Mr. Hackley filed his original patent application, he swore that the foregoing was a clear, concise and exact description of his invention, viz., the apparatus which was used by the respondents at the Skagit River tunnel. It was just that. Moreover, it is an excellent description of a machine embodying the invention of the McMichael patent in suit. Hackley's specification and drawing not only show it to be an embodiment of the McMichael invention, so far as its structural characteristics are concerned, but also points out that the device operates in accordance with the plan or principle which McMichael and the plaintiff have always attributed to the apparatus of the patent in suit.

This Hackley patent application was filed on March 26, 1924. His machine had been in use at the Skagit River Project at least five or six months before this application was filed. (Oxenham saw the Hackley machine in operation on October 13, 1923, R., p. 78.) Therefore, Hackley was describing his machine *on the basis of experience* when he filed his patent application.

After the filing of this suit in April, 1924, Hackley's attorneys (representing respondents herein) rewrote the Hackley specification in a belated attempt to make it appear that the Hackley device operates differently from that of McMichael, notwithstanding that the devices of Hackley and McMichael comprise the same elements, arranged in the same way, and therefore *must* operate in the same manner. The original Hackley specification was written at a time when Hackley and his attorneys had no motive for misstating the operation of the machine. The specification was changed to the form in which it appears in the Hackley patent (Exhibit Book, p. 78) after this suit had been brought and at a time when Hackley and his counsel were more concerned with meeting what they conceived to be the exigencies of this case

than they were in having the Hackley patent properly describe the machine which it illustrates.

The Claims in Suit Accurately Describe Respondents' Devices.

Each and every of the claims in suit is for an apparatus, and each of these claims (1, 2, 17, 18, 24, 29, 34 and 35) reads upon and accurately describes each of the machines which respondents used at the Skagit River tunnel, *i. e.*, the device shown in the drawing, Plaintiff's Exhibit 13 (Exhibit Book, p. 84), and the later and slightly modified machine shown in the Hackley patent application drawing (Exhibit Book, p. 83).

Applying claim 1, for example, to the drawing, Exhibit 13, we have the following:

> "**In combination, a chamber for containing concrete forming materials** (the respondents' device, of course, has such a chamber), **a conduit leading therefrom** (the respondents' device has the conduit), **and having its walls joining the chamber walls with substantial smoothness** (the respondents' conduit obviously does join the chamber walls in this fashion), **and two compressed air inlet pipes connected to the chamber** (the velocity nozzle located directly in the tapering exit end of respondents' container is the terminal of one of these pipes; the other pipe may be any one of the other pipes entering the chamber,—for instance the pipe which enters the lower part of the rear end of the chamber), **one of them terminating in a nozzle** (the velocity nozzle) **inside the chamber** (like in McMichael's patent, respondents' said nozzle is located inside the tapering part of the chamber) **directed toward the opening into the said conduit and the other pipe opening into the chamber at a point remote from said nozzle.**" (The aforesaid pipe which enters the lower end of the rear wall of respondents' chamber is certainly "remote" from the velocity nozzle.)

Each of the other claims in suit is just as aptly and accurately descriptive of the respondents' machines as is claim 1 above quoted.

There is no escape from the conclusion that each of the respondents machines infringes the claims in suit, if your Honors find that the claims in suit are valid.

THE PRIOR ART.

Petitioner's Position Is Strengthened—Not Weakened—by the Very Number of Patents and Publications Relied Upon by the Respondents.

At the trial respondents placed in evidence literally hundreds of pages of printed matter in the form of patents and excerpts from periodicals. Only a portion of these are included in the enormous Exhibit Book in this case. The answer and amended answer plead 166 prior patents and 80 printed publications in alleged anticipation of McMichael.

It is obvious that if counsel for respondents had a single good reference, or even a fair reference, he would have been content to rely upon it, and would not have loaded the record with the appalling number of prior patents and publications which it now contains.

Respondents' counsel in offering dozens of patents and dozens of publications and scores of pages of depositions concerning alleged uses of sulphur mining apparatus, dredgers, grout and paint shooters, etc., is simply trying to "make omelettes of bad eggs," to use the words of his Honor Judge Hough in *Ball & Roller Bearing Co.* v. *Sanford Mfg. Co.*, 297 Fed. 163, 167, wherein it was said:

> "The voluminous record at bar is the best (or worst) example recently presented to us of useless

and misleading references to earlier patents and publications. It seems necessary to apply to patent litigation from time to time the maxim that one cannot make omelettes of bad eggs--no matter how many are used. One good reference is better than fifty poor ones, and the fifty do not make the one any better."

The Publications.

The many publications, in the form of excerpts from domestic and foreign periodicals, proceedings of technical societies, etc., offered in evidence by the respondents, add nothing to what is shown by the many patents upon which the respondents also rely. For the most part the publications have only to do with uses, here or there, of apparatus such as is shown in one or more of the patents. We shall, therefore, refrain from analyzing the publications. The patents actually disclose all and more than can possibly be gleaned from the publications, no matter how carefully the latter may be studied.

The Prior Patents.

At an earlier point in this brief, we stated that the pneumatic conveyors which preceded McMichael, and which were unsuitable for his purpose, belong to *two* generic classes. Firstly, there is that class of conveyor wherein the conveyed materials are carried along a conduit in *suspension* by the kinetic energy of an air stream, or, in other words, are carried as dust is blown in the wind. Secondly, there is that class of conveyors wherein air is applied to a liquid, or to a fluid mixture of liquid and entrained solids, to cause the liquid or fluid mixture to *flow* as water flows through a hose or pipe or as tooth paste emanates from the familiar collapsible container.

The twenty-five patents of the prior art which were offered in evidence by the respondents at the trial, fall into these two generic classes, as shown by the classification following this paragraph. In this classification conveyors of the type which transport materials through a conduit in suspension by the kinetic energy of an air stream appear under the heading "Kinetic Air Flotation." Those patents which disclose conveyors in which liquids, or fluid mixtures of liquids and entrained solids, are caused to *flow*, appear under the generic heading "Liquid Flow." There are twenty patents in this last mentioned group which, for convenience, we have divided into three sub-groups, *i. e.*, the patents showing devices which handle *cementitious materials* constitute one sub-group, the patents which show *lift pumps* constitute a second sub-group, and the patents which show devices which cause the flow of a *fluid mixture of liquid and entrained and suspended solids (other than cementitious materials)* constitute a third sub-group.

Classification of Prior Art Patents.

Kinetic Air Flotation.

Goldie, 707,840—dry cement (p. 514).[1]

Sickels, 99,360—sand and earth from caissons (p. 614).

Warren, 671,303—sand blast (p. 650).

Butler, 660,946—sand for locomotive sand boxes (p. 654).

Kolsche German, 18,394—sand, granules and coal-slack (p. 658).

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1 The pages given are those of the Exhibit Book.

Liquid Flow.

Cementitious Materials.

Smith, 122,498—so-called "Liquid" concrete of a consistency which will flow through valves and "settle to a perfectly level surface" (p. 484).

Goldie, 676,128—grout (p. 498).
Goldie, 676,129—grout (p. 506).
Moir, 778,878—lime grout (p. 520).
Canniff, 873,345—grout (p. 544).
McIlvrid, 958,421—grout (p. 560).

Lift Pumps.

Pohle, 487,639—water (p. 566).
Saunders, 597,023—water (p. 572).
Frasch, 799,642—liquid sulphur (p. 582).
Frasch, 800,127—liquid sulphur (p. 590).
Frizell, 233,499—water (p. 636).
Harris, 759,100—deep well fluids (water-oil) (p. 640).
Harris, 814,601—water (p. 644).

Entrained and Suspended Solids.

Duckham British, 4400/75—mud or spoil from dredges (p. 598).

Duckham British, 15,348/85—mud or spoil from dredges (p. 606).

Hussey, 497,427—water and mud from dredges, "gravel, mud, debris and other materials" (p. 662).

Hussey, 526,530—water and mud from dredges, "ground, gravel and other debris in water" (p. 670).

Rix & Donahoo, 635,270—water and spoil from dredges (p. 618).

Church, 487,606—alabastine paint "atomization by air spray nozzle" (p. 624).

Discussion of "Kinetic Air Flotation" Patents.

Of the five patents in this group, two of them, namely, Goldie 707,840 and the Warren patent, were urged upon his Honor Judge Hand in *both* of the prior suits involving the McMichael patent, and the Kolsche German patent was pleaded but not put in evidence. (See records in Ulen and Powers-Kennedy cases, Plaintiff's Physical Exhibits 4 and 11.)

The Sickels and Butler patents do not differ essentially from the others of this generic class of kinetic devices.

In all of these devices the material to be conveyed, whether it be dry cement, as in the Goldie patent, sand from a sand blast machine, as in the Warren patent, slack, sandy or granular material, as in Kolsche, is *carried along in suspension due to the kinetic energy of a moving current of air.* The material conveyed is swept along as dust is carried by the wind in a storm. In a device of this kind the lighter particles of the conveyed material are, of course, carried ahead of the heavier particles. All of these patents disclose devices which operate in accordance with a principle—kinetic air flotation—which renders them totally unsuitable for use in the transportation of concrete. Incidentally, if either McMichael or respondents used kinetic conveyors (which, of course, they do not) the volume of air consumed would be colossal,—the expenditure for compressing and supplying that air would be prohibitive. It would take an enormous volume of air traveling at fearful velocity to carry as heavy a material as concrete in suspension.

The *Goldie patent* No. 707,840 shows a *proposed* method of placing cement under railroad ties by first raising each tie and then blowing dry cement—an almost impalpable powder—along with moisture, under the tie. There is no

pressure back of or behind the material and no material to be acted on as a mass. The dry cement passes out of the vessel by gravity alone, and the material is conveyed and delivered in a completely disintegrated state. The apparatus is not adapted to be used and could not be used to handle *any* material in the manner provided by the patent in suit, and is not adapted nor intended to be used with *concrete* for *any* purpose.

The *Sickels patent* No. 99,360 shows a scheme for lifting excavated materials out of a caisson by a current of air blowing into the lower end of a pipe which projects into a caisson chamber in which a workman digs. When the comparatively gentle blast which blows through the pipe due to the working pressure of the caisson is not sufficient to pick up the materials, the *velocity* of air through the pipe may be increased by opening a valve *g*. The Sickels arrangement obviously taught nothing to McMichael or any one interested in transporting concrete without separating its aggregates.

The *Warren patent* No. 671,303 shows a sand blast machine of the conventional type, wherein sand flows down into a rapidly moving air stream and is carried along in suspension due to the velocity of the air.

The *Butler patent* No. 660,946 shows a pumping apparatus for water or sand. The patent shows two devices, one for water and the other for sand. This patent discloses nothing more than a small pipe adapted to be projected more or less into a sand or water receptacle, and which is provided with an air injector tube to establish a vacuum at the intake end of the pipe and establish a draft in the pipe to cause the transmission of the water or sand to be conveyed. When handling sand, the Butler device is a kinetic conveyor. When used with water, it has the characteristics of an ordinary water lift.

The *Kolsche German patent* No. 18,394 shows a typical velocity conveyor of the kind commonly used for transporting sand, grain and other granular materials which feasibly can be blown along in a pipe as dust is carried in the wind. In the Kolsche device the materials to be conveyed drop down into a current of rapidly moving air and are swept along in suspension by that current to the place of deposit. This is an excellent example of a kinetic conveyor,—totally unsuitable for the conveyance of concrete. It is one of the patents said by Judge Bourquin to be anticipatory of McMichael. (The Ninth Circuit Court of Appeals did not mention it.) We have therefore considered this patent in more detail, at a later point in the brief, under the heading "The Kolsche German Patent."

Discussion of "Liquid Flow" Patents.

The patents of this generic group differ considerably as to details of construction, but they all have one thing in common which distinguishes them from the concrete conveyor of the McMichael patent and renders them totally unsuitable for the conveyance of concrete—they all contemplate carrying the conveyed material as a fluid, *i. e.*, as a liquid or as a fluid mixture of a liquid and entrained solids.

Counsel for respondents has gone beyond all reason in the citation of prior art patents, and as is to be expected has cited a number of patents in this class of "Liquid Flow" which counsel in the Second Circuit cases wisely did not see fit to cite. It is interesting to note that many of the representative patents of this group upon which counsel relies in this case were presented in the Eastern cases, *i. e.*, the Smith patent 122,498, the Goldie patent 676,128, the Canniff patent 873,345, the

McIlvrid patent 958,421, and the Church patent 487,606 (see records in Ulen and Powers-Kennedy cases, Plaintiff's Physical Exhibits Nos. 4 and 11). It is also interesting to note that during the prosecution of the McMichael application the Patent Office considered the Pohle water-lift patent No. 347,196, which is representative of all of the patents in the sub-class of "Lift Pumps" upon which counsel for respondents relies in this case (see action of Jan. 24, 1907, McMichael file-wrapper, Exhibit Book, p. 205).

Liquid Flow—Cementitious Materials.

Of the six patents in this sub-group only two (Goldie 676,129 and Moir 778,878) were not presented in the New York cases.

All of the six patents in this sub-group are intended to handle liquids which do contain cementitious materials, but are *fluids* nevertheless. All of the patents in this sub-group, except the Smith patent, have to do with handling grout. *Grout* is simply a fluid mixture, sometimes a plastic fluid mixture, which can be easily forced through a pipe, even a very small pipe, by pressure exerted upon the fluid mixture, in a container from which it is to be ejected. The Smith patent is intended to handle a so-called "liquid concrete" of a consistency such that it will flow through valves and "settle to a perfectly level surface." None of the parties whose patents are included in this sub-group was concerned with the transmission of a material having the physical characteristics of ordinary concrete. More important, none of these patents discloses any arrangement of parts which will act upon a conveyed material as does the structure of the McMichael patent. No one of the patents in this sub-group discloses anything even remotely sug-

gestive of McMichael's velocity jet, which acts upon a mass of concrete *at the very point where it is compacted* at the ingress end of the conveyor conduit.

The *Smith patent* No. 122,498 is one which the Ninth Circuit Court of Appeals regards as anticipatory of McMichael, notwithstanding that this patent was considered and found not anticipating by the Second Circuit Court of Appeals in the Powers-Kennedy case (see Powers-Kennedy R., Plaintiff's Physical Exhibit 11). Therefore, we have given it special consideration under the heading "The Smith Patent of 1872."

The *Goldie patent* No. 676,128. Goldie says in his patent (p. 3, line 43) that it is his intention "to form a plastic body of cement of grout sufficiently fluid to flow from the basin into the feed pipe 14." The ingredients to form a fluid grout are placed in an ordinary funnel which is provided at its lower end with a stop cock. After the materials have flowed down out of the funnel, in the delivery pipe, the stop cock is shut off and air is pumped into the delivery pipe with a hand pump to cause the grout to flow under railroad ties. This patent simply fails to disclose any of the essential features of the McMichael invention.

The *Goldie patent* No. 676,129 shows an apparatus which is identical with the apparatus shown in the other Goldie patent 676,128. It is not believed that Goldie intended the disclosures of these patents to be different in any respect. One covers a *method* of injecting grout under railway ties, and the other covers the *apparatus* employed in carrying out that method.

The *Moir patent* No. 778,878 discloses a structure wherein a piston operating in a cylinder acts directly upon a fluid mixture of "lime grout, lime cement or other viscous fluids" to cause them to flow through a pipe,—exactly as tooth paste flows out of its container, or as

grease flows out of a grease gun. The Moir structure lacks all of the essentials of the McMichael combination. It has absolutely nothing in the way of a velocity jet acting upon a compacted mass of materials at a particular place for a definite purpose. If the Moir patent is of any significance in this case, it is only because it shows that the handling of fluid grout is an entirely different proposition than the handling of concrete. Grout is a true fluid and can be squeezed out of a compressor of the piston type just like grease or any other material which will flow.

The *Canniff patent* No. 873,345 shows another device for handling fluid grout. Canniff developed a device which was a very successful *grout* mixer and conveyor and which is being used by the Ransome Company and others to the present day. It is generally recognized as an excellent grouting machine. But Canniff never contemplated that it should be used for handling concrete. It is not adapted for handling concrete, and has never been practically used for that purpose. The mode of operation of the Canniff machine is essentially different from that of the McMichael apparatus. Canniff first injects air into the fluid mixture of grout to mix it. After this mixing has been accomplished, he causes the fluid mixture to flow out of the apparatus by a pressure of air exerted upon the mass. Being a true fluid, the grout will flow perfectly out of an apparatus of this kind. Respondents put in some testimony to show that they did cause something which might be called "concrete" to flow out of something which they *called* the Canniff apparatus. The alleged Canniff device which respondents employed was, however, a *reconstructed* Canniff device. It is of unknown origin,—possibly constructed within recent years. Even if it did eject concrete after a fashion that is a matter of no consequence in this case, because the

Canniff apparatus, even in the reconstructed form in which respondents attempted to use it for concrete, cannot and does not operate as does the McMichael apparatus. It does not comprise the peculiar arrangement of elements which co-operate to make possible McMichael's characteristic mode of operation.

The *McIlvrid patent* No. 958,421 shows another machine for causing a fluid grout mixture to flow by pressure exerted upon the surface of the fluid mass within a chamber with which a hose is connected. Aside from certain features of construction, which are of absolutely no interest in this case, the grouter of the McIlvrid patent does not differ in any material respect from the devices of the Moir and Canniff patents, *supra*.

Liquid Flow—Lift Pumps.

It is probably because counsel for respondents has injected this group of *lift pump* patents into this record, that he contends the prior art presented in the case at bar is *different* from the prior art presented in the Second Circuit cases. As we view the matter, counsel for the defendants in the Eastern cases are to be complimented, rather than censured, for not having imposed upon the courts the consideration of patents so far afield from conveyance of concrete as are these patents showing *lift pumps*.

These patents are all concerned with getting some liquid, *i. e.*, water, oil, or liquid sulphur, out of a hole in the ground by injecting air into a pipe containing a column of the liquid to lighten the column and permit it to rise. Quite obviously, no one of these patents discloses anything which was ever used for the transportation of concrete, or which could be used for such purpose. Counsel for respondents seem to believe that these

lift pump patents have some degree of pertinency to the case at bar, because in the operation of these lift pumps the lifted fluid usually comes out of the upper end of the pipe in gulps, that is to say, first a certain quantity of water, then a quantity of the air which was used to lighten the column, then another quantity of water, etc. We freely admit that lift pumps do operate in this way. They have been known from time immemorial. The lift pump art is much older than any of the patents cited by respondents. It seems entirely sufficient to say that no one of these lift pump patents discloses McMichael's structure, that no one of them could be used for conveying concrete, that no one of them was ever used for conveying concrete. The structures of these lift pump patents are as different from the McMichael structure as anything that can be imagined. No one, not even the respondents in their extremity, has ever attempted to use the lift pump theory in transporting concrete. The operation of a lift pump depends solely and simply upon *lightening* a column of *liquid* by injecting air into it. Concrete is simply incapable of being transported or lifted by any such treatment.

The *Pohle patent* No. 487,639 discloses a water lift of the most simple type. A column of water is lightened by injecting air into it. The lightened column naturally rises due to the hydrostatic head of the liquid surrounding the pipe into which the air is injected.

The *Saunders patent* No. 597,023 discloses another lift pump wherein a column of water is lightened and caused to rise out of a well by injecting air into it.

The *Frasch patents* Nos. 799,642 and 800,127 show nothing more than the utilization of the water lift idea in the elevation of *liquid sulphur*. The liquid sulphur devices of the Frasch patents operate upon precisely the

same principle as do the earlier water lifts of Pohle and Saunders. Much testimony was taken to show that liquid lifts of the type shown in these Frasch patents were used in sulphur mining. Surely they were used for mining liquid sulphur, but no one, not even the respondents, contends that these devices could be used for transporting concrete. Moreover, these devices are totally incapable of being *reconstructed* to handle concrete. They involve a principle of operation which is not applicable to the transportation of concrete.

The *Frizell patent* No. 233,499 shows another water lift, and deserves no special comment. This inventor tried to get away from having his water gulp out of the top of his pipe, and accomplished this objective by lightening his column of water by air admitted "in the form of minute bubbles."

The *Harris patents* Nos. 759,100 and 814,601 are also concerned simply with lifting a liquid out of a well by lightening a column of the liquid by the admission of air to the column. Harris was concerned primarily with the elevation of oil out of oil wells.

Liquid Flow—Entrained and Suspended Solids.

The six patents of this sub-group are all concerned with handling fluids which have solids, such as mud, sand, rocks, etc., entrained in the water which is the *carrying medium*. All of these devices work upon the theory that water can be *pumped*, whether it be clean or dirty, and that the presence of entrained solids (even very large solids in large pumps) will not prevent the water from being pumped. For the most part the patents of this sub-group relate to pumping and dredging operations where water containing mud or "spoil," sand and gravel is merely pumped in one of the oldest ways known to

mankind, that is to say, by causing the water and its entrained solids to flow into a closed chamber and then exerting pressure upon the water to flow it out of the chamber. Devices of this kind operate in accordance with a principle which is of no avail in the transportation of concrete, namely, that a pump will handle solids if accompanied by sufficient water. Neither McMichael nor respondents *pump* concrete. It is obvious that if sufficient water were added to concrete to permit it to be *pumped,* it would be unusable for any practical purpose. Before a mixture of water and entrained solids can be pumped, the water must be the predominating ingredient of the mixture. Water is not and should not be the predominating ingredient in concrete. Even the wettest of "wet concrete" does not comprise anything like the proportion of water which is necessary before mud or spoil from dredges can be *pumped.*

The *Duckham British patents* Nos. 4400 of 1875, and 15,348 of 1885, show mud pumps, *i. e.,* devices which are adapted to discharge water and entrained mud from a barge by air pressure applied to the fluid mixture of water and mud. The patents lack all of the essentials of the McMichael apparatus, operate differently than does the McMichael apparatus, and could not be utilized for the conveyance of concrete. However, counsel for respondents and the courts below in this case lay particular stress on these patents—because they speak of (*but do not illustrate*) the use of air and water *nozzles as agitators,* or, as Duckham says, so that "the particles are prevented from settling and are *kept in suspension* until the whole is expelled from the tank." These Duckham patents certainly fall far short of being "anticipations" of the McMichael invention, but since the Ninth Circuit Court of Appeals regards them as important, we have discussed them quite fully under the later heading,

"The Duckham British Patents Nos. 4400 of 1875 and 15,348 of 1885."

The *Hussey patents* Nos. 497,427 and 526,530 show so-called "vacuum dredges," which, by condensation of steam, suck water and entrained solids into a chamber, and then, after the closing of the intake port of the chamber and the opening of a discharge port, cause the water and its entrained solids to flow out of the chamber by applying steam to create a discharging pressure.

These Hussey dredgers were probably very satisfactory devices for the purpose for which they were intended. Respondents' counsel has taken depositions to show that they were successful dredging devices. The important consideration, however, is that the Hussey vacuum dredger lacks all of the essential features of the McMichael structure, and operates in accordance with an entirely different plan. The McMichael apparatus is certainly something entirely different from a device which sucks water and entrained spoil into a tank and then merely ejects it by applied pressure. Being a different kind of device, the McMichael apparatus embodies different means,—a different combination of elements—a combination of elements which Hussey does not disclose.

The *Rix & Donahoo patent* No. 635,270 shows another type of dredger which conveys mud and "spoil" by flotation in water. The apparatus of this patent has no relation to the McMichael apparatus and operates according to an entirely different plan. It would be totally unsuitable for the conveyance of concrete.

The *Church patent* No. 487,606 shows a device for spraying alabastine paint. The defendants in the New York cases, like respondents in this case, cited it, but for what reason we are unable to perceive. It is as remote from the McMichael invention as anything that can be imagined.

The Smith Patent of 1872.

(Exhibit Book, p. 484.)

In speaking of this patent the Ninth Circuit Court of Appeals in its opinion said:

> "The device contained all of the features of appellants' (petitioners') patent **except the nozzle for admission of air near the point of exit.**" (R., p. 669.)

Since the device of the Smith patent admittedly lacks that essential element—the velocity nozzle—it is immaterial whether or not the Smith device will work. If it will work, it works differently from the McMichael machine and differently from respondents' machines, because both the McMichael machine and respondents' machines depend for their effectiveness upon a velocity nozzle located just where the concrete passes from the container into the conduit.

We believe that your Honors, bearing in mind that the velocity nozzle is a distinguishing element of all of the McMichael claims in suit, will agree with the Second Circuit Court of Appeals when, in the Powers-Kennedy case, it says of the Smith patent: **"It cannot be regarded as an anticipation."**

In comparing Smith's device with the McMichael apparatus, counsel for respondents has said:

> "Smith operated on the *same object or material*, for the same purpose and with the *same means.*"

Let us see whether or not Smith did act on the *same material* as McMichael, and also whether or not Smith did utilize the *same means.*

Smith was not handling the same material as McMichael. This clearly appears in the specification of the Smith patent. The material which Smith handled, although called liquid "concrete" was in fact a

very thin watery mixture which would flow through a tortuous passage *d* from the mixing hopper C to the air chamber F. Over and over again in his specification, Smith emphasizes the fact that the composition must be thin enough to flow with great facility. In the fourth paragraph of his specification, he says that his device is to handle a composition "the properties of which are adapted to be conveyed and laid while in a *fluid state.*" In referring to how the liquid composition gets from the mixing hopper C through the tortuous passage *d*, Smith says: "I then open the valves and let it *flow off* through the pipe D." He also says that the composition is "*sufficiently liquid* to settle to a *perfectly level surface.*"

It is clear that concrete to be used in tunnel linings, etc., or for any other useful purpose, as conveyed by the McMichael apparatus, is not the same as the soupy fluid which was the only thing which the Smith apparatus could handle. Concrete such as is used in tunnels (such as is used by respondents) could not possibly flow through the tortuous passage *d* of the Smith apparatus. Moreover, concrete such as handled by McMichael, and such as is placed by the respondents[1] is certainly not "sufficiently liquid to settle to a perfectly level surface" as specified by Smith.

The particularity with which Smith specified that the composition handled by his machine must be a "*liquid* composition" emphasizes the dissimilarity between the

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1 The concrete used by respondents is described by the witness Oxenham (R., p. 530) as follows:

"Q. When you observed the operation of the pneumatic placing apparatus in the Skagit River Tunnel and the operations there of the Hackley machine, did you observe whether the concrete forming materials were of a consistency such as that they stood in a pile with sloping sides or whether those materials would, of their own flow assume a level condition?

"A. Stood in a pile."

Smith structure and that of McMichael. The McMichael apparatus is not limited to the use of such a useless "liquid composition." If it were so limited, it would be an unused device, just as the Smith device is unused. It is not even limited to a "wet" composition (Pat., p. 3, lines 49-59). The Smith patent shows on its face that Smith did not know how to handle ordinary concrete like that handled by the McMichael machines, that is concrete such as is used in tunnels and in building operations, which has an inherent tendency to bridge and arch and to block and jam any passage through which an attempt may be made to cause it to flow. Not knowing how to handle the kind of concrete which everyone wants to use, Smith was obliged to confine himself to *liquid concrete*,—something which no one wants to use, or would be permitted to use. Therefore, the Smith patent passed into the oblivion from which it first emerged to meet the exigencies of the defendant in the Powers-Kennedy case.

But even if it were admitted that Smith did contemplate handling concrete like that handled by McMichael, the fact would nevertheless remain that the *means employed by Smith is different from that of McMichael.* If there is any one salient fact which is emphasized in the McMichael patent or which has been demonstrated by the testimony and arguments in this case, it is that McMichael's velocity jet, *acting upon a compacted mass of concrete at a definite point for a particular purpose,* is an absolutely essential element of the McMichael combination. This element, as well as the sloping walls of the container, which co-operate with the velocity jet to give McMichael's apparatus its characteristic mode of operation, are lacking in the Smith disclosure. Smith did not get McMichael's results. The Smith device is and always has been a failure. It was never heard of in the forty-three years between its grant and the grant of the

McMichael patent. This is so because Smith does not disclose the *means* of McMichael.

Because Smith did not disclose the *means* of the McMichael patent, he was obliged to limit himself to "*liquid* concrete." If respondents want to use the Smith apparatus, we shall not quarrel with them. But the respondents do not want to use the Smith apparatus. The respondents use McMichael's essential combination in order that they may get McMichael's results,—in order that they may successfully transport concrete of a character which Smith could not handle.

The language of Judge Coxe in *Cimiotti Unhairing Co. v. American Company,* 115 Fed. Rep. 498, 500, is applicable to the Smith patent. Judge Coxe said:

> "It emerged from oblivion solely to meet the exigencies of this litigation."

The Duckham British Patents Nos. 4400 of 1875 and 15,348 of 1885.

(Exhibit Book, pp. 598 and 606.)

The Duckham patents mention but *do not illustrate* certain nozzles for stirring up mud in a tank.

The Ninth Circuit Court of Appeals in its opinion quotes from the Duckham 1875 patent as follows:

> "I prefer to inject compressed air . . . through a number of nozzles **at the bottom of the tank, said nozzles being pointed toward the outlet.** By this means the particles are prohibited from settling and are kept in suspension until the whole is expelled from the tank. Compressed air may, moreover, be admitted **into the discharge pipe** with the same object." (R., p. 669.)

Then the court reaches a conclusion as follows:

> "We think it indisputable that Duckham in prescribing the use of pipes for the admission of com-

> pressed air in the tank, the same distributed along the bottom of the tank, and **one of them locatable at the exit**, presented the use of all that is included in the appellant's combination, save and except the U-bend. . . ."

We respectfully submit that the matter quoted from the Duckham 1875 patent does not justify the conclusion that Duckham contemplated a "*nozzle locatable at the exit.*" Obviously, Duckham could have had many pipes "at the bottom" and "*pointing* toward the exit" which would not in any sense act upon the material (mud and water) at the place where the material passes from the container into the conduit.

Furthermore, the statement quoted from Duckham that air might "be admitted into the discharge pipe" can, and we think certainly does, mean something entirely different than placing a nozzle as did McMichael *at the very place* where the material passes from the container into the conduit. The mere placing of a nozzle in a conduit is insufficient to meet the requirements of a concrete placing machine. As taught by McMichael, and as demonstrated by the commercial practice of petitioner, the respondents in this case, and the defendants in the New York cases, the nozzle must be at the *very place* where the container merges into the conduit.

There is, therefore, in the Duckham 1875 patent no justification for the conclusion of the Ninth Circuit Court of Appeals that Duckham prescribed the use of nozzles "*locatable at the exit.*"

Moreover, the Duckham 1875 patent contains an additional statement which is entirely out of harmony with the conclusion that Duckham might have had a nozzle at the place where his material passed from the container into the pipe. Duckham says:

> "To prevent the choking of the pipes a *screen or grating* is provided through which the mud or spoil

passes before it enters the outlet pipe." (Provisional Spec., p. 2; Complete Spec., p. 4.)

Therefore, the thing which Duckham had at the point where the material passed from the container into the conduit was a screen or grating. The *unillustrated* nozzles were undoubtedly located away from the screen or grating and "along the bottom" or even perhaps in the discharge pipe at points away from this screen or grating.

Even if the Ninth Circuit Court of Appeals entertained a doubt as to what Duckham *intended,* that doubt, under authorities too numerous to mention, should have been resolved against Duckham and not against the McMichael patent.

Particularly should any doubt be resolved against Duckham when it is considered that the Duckham apparatus, even if it were provided with an air or water nozzle placed at the junction of chamber and conduit, would require *other radical changes* before it would be available for handling concrete. For instance, the Duckham conduit does not join the chamber walls with that "substantial smoothness" which is recited in some of McMichael's claims and which is so very necessary in a concrete placer. Moreover, to handle concrete, Duckham would necessarily have to use entirely different pressure than the fifteen pounds per square inch which he used in handling mud and spoil. Pressures of approximately one hundred pounds per square inch are required in a concrete placer. These are but two of the reasons why the Duckam apparatus would require radical modification, in addition to providing it with a nozzle at the beginning of the conduit, if an attempt were made to use the Duckham apparatus for placing concrete.

The Duckham idea consisted in providing a barge with enormous cylindrical tanks for the storage of water and

entrained mud which was to be transported by the barges from a point where it was taken off of the sea bottom. Duckham discharged the water and its entrained mud by *flowing it* through pipes. The fluid mixture of water and mud flowed so readily that it could be ejected by a pressure as low as *fifteen pounds* per square inch (see the publication Defendants' Exhibit 29, Exhibit Book, p. 188).

Obviously, when mud and water are stored in an enormous tank such as was used by Duckham, some of the mud will settle to the bottom of the tank and must be stirred up if it is going to flow off with the water. Duckham in his patents *suggested* two ways of stirring up the mud so that it would flow off with the water. *He did not illustrate either way in his drawings.* One way which was suggested was to use mechanical agitators. The alternative scheme for stirring up the mud was to use air and water nozzles.

The Ninth Circuit Court of Appeals refers to the minutes of the proceedings of the Institution of Civil Engineers for 1887 (Exhibit Book, pp. 187-188) and quotes therefrom, as the language of Duckham, an excerpt from an article which apparently was not written by Duckham but which article, in referring to a Duckham device of some kind (whether or not it was the device of the Duckham patents does not appear), said:

> "with clay or stiff mud, if the nozzles of the air-injection pipes were too small, the compressed air instead of driving out the material simply pierced holes through it, escaping through the discharge pipe and carrying along with it all the liquid and thin material in the tanks. This defect was easily rectified by rearranging and increasing the size of the injection nozzles, and the apparatus now gives most satisfactory results." (R., p. 670.)

The fact that the nozzles of Duckham performed their

mud agitating function better after some "rearranging" certainly does not justify the assumption that Duckham's nozzles were "rearranged" or ever arranged in a position corresponding to the position of the velocity nozzle of the McMichael concrete placer.

The Kolsche German Patent.[1]

(Exhibit Book, p. 183.)

Judge Bourquin, in referring to this old German patent No. 18,394 of 1881, said (R., pp. 619 and 620):

> "The third is Kolsche's German patent 18,394 of 1882 for 'apparatus for conveying substances slack, sandy or granular material, by means of a **current** of air.'
>
> "The apparatus is like McMichael's without the U bend. That is, it is an upright cylindrical container with hopper bottom terminating in a discharge pipe. Compressed air is applied above or behind the material in the container to force it down and into the discharge pipe, and at that point like air is admitted to assist in driving the material through the pipe.
>
> "**Without any change**, perhaps save adjustments to circumstances as always, **Kolsche's apparatus and method will transport concrete as does McMichael's.** Kolsche could rightfully devote it to that analogous use. It follows that McMichael's essentially unchanged application of Kolsche to analogous materials and uses, is not invention. In principle, essential design, function, operation, object and result, Kolsche and McMichael are one and the same. **Either reads on the other.**
>
> "Kolsche, if later and devoted to concrete, might infringe McMichael, and by the same token being earlier, he anticipates him." (Bold-face ours.)

Apparently Judge Bourquin arrived at the above con-

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1 This patent was not mentioned in the opinion of the Ninth Circuit Court of Appeals although one of the prior art patents stressed by respondents below.

clusions from mere inspection of the Kolsche drawing. Certainly if he had read the specification of the Kolsche patent he should have perceived that it illustrates and describes a *kinetic conveyor* which operates in a manner radically different from the operation of the concrete placers under consideration in this case. In the following quotation from a translation of the Kolsche patent (Exhibit Book, p. 183) the bold-face is ours:

"GERMAN PATENT No. 18394

"Ludwig Kolsche, Haardt, Westfalen,

"Protected from Oct. 16, 1881: Issued July 4, 1882: Class 35.

"APPARATUS FOR CONVEYING SUBSTANCES SLACK, SANDY OR GRANULAR MATERIAL BY MEANS OF A CURRENT OF AIR.

"The apparatus comprises the intake nozzle *a* and the air passage *d e*, through which a **continuous current** of air is driven **by means of a blower (fan)**. This **current** must be of such strength that the particles **dropping down through the opening** *c c* are engaged and **carried along** through the entire air passage *d e* and collect in a heap on discharging from the passage *e*."

It is clear from the Kolsche specification, even from a careful examination of the Kolsche drawing, that this patent describes a *kinetic conveyor, i. e.*, one in which the conveyed materials are carried along in suspension by the velocity of a *current of air.*

It is also clear that Kolsche does not disclose anything corresponding either in *construction, location* or *function* to McMichael's slug forming velocity nozzle.

Kolsche employes a blower or fan, not shown, which is located somewhere to the left of his machine (as shown in the patent drawing) and the *blower* sets up a *current* of air which picks up and carries along "particles" which "drop" down through the openings *c-c*.

If concrete were put in the Kolsche device, it would immediately arch and jam at the small openings *c-c*. More important, from the standpoint of this case, there is no slug forming nozzle in the Kolsche disclosure.

Judge Bourquin was clearly in error when he said:

> "Kolsche, if later and devoted to concrete *might* infringe McMichael"

because the Kolsche construction lacks, among other things, the salient feature of the McMichael claims. It has no nozzle or anything which could function as does the velocity nozzle of McMichael.

If respondents care to use the kinetic conveyor of Kolsche, or any other kinetic conveyor for that matter, they will become involved in no quarrel with this petitioner.

The Allegation of Prior Invention and Use by Thomas S. Leake.

In an attempt to show that the invention of the patent in suit had been known and publicly used in New Orleans prior to the filing of McMichael's patent application in January, 1907, the respondents, in 1927, took the deposition of Mr. Thomas S. Leake (R., pp. 578-609). The trial court did not see the witness. At the time he testified Mr. Leake was 67 years old and relied entirely upon his memory in testifying about things he was supposed to have done in 1905—22 years earlier. His testimony is full of inconsistent statements and repeated assertions of poor memory in regard to the events of 1905.

Counsel for respondents did not attempt to corroborate this deposition by the testimony of any other witness. The device alleged to have been used in 1905 was shown to have been almost immediately destroyed (R., p. 593). A pencil sketch made by Leake is in evidence as "Defend-

ants' Chicago Exhibit 127" (Exhibit Book, p. 694). *There is nothing in the record to show when this sketch was made.* (We happen to know, however, that it was made less than a year and a half ago while Leake was testifying in another case involving the McMichael patent.) The record does not contain a shred of contemporaneous documentary or physical evidence to support Leake's recollection of what happened in New Orleans in 1905.

Leake's Sketch Does Not Show a Velocity Nozzle and Leake Does Not Claim to Have Used Such a Nozzle in His 1905 Experiment.

All of the McMichael claims involved in this suit in one way or another recite the velocity nozzle as an element of the patented combination. This velocity nozzle, which acts upon the concrete at the point which it is compacted in passing from the chamber into the conduit, is an absolutely essential element of the pneumatic concrete placers with which this suit is concerned. Therefore, anything which Leake may have done in New Orleans in 1905 would seem to be entirely immaterial to the issues of this case, when it clearly appears that whatever he used certainly did not include the velocity nozzle.

The Leake sketch, Chicago Exhibit 127, shows no nozzle at the junction between the container and the conduit.

Furthermore, Leake's testimony very clearly indicates that the New Orleans experimental device of 1905 did not have anything corresponding to the velocity nozzle.

On direct examination Mr. Leake was asked various questions intended to draw forth a comparison between his 1905 experiment and a device which he, Leake, afterwards placed in the Webster Building in Chicago in 1907

or thereafter, *i. e.*, long after the filing of McMichael's application. This later device, at the Webster Building, did comprise something like the velocity nozzle which was new with McMichael. The New Orleans experiment did not. The testimony is as follows:

> "Q. That (the Webster Building machine made long after McMichael's filing date and having a velocity nozzle) was the same machine in theory, using new materials, but constructed in the same general design as the one you had used in New Orleans, was it not?
>
> "A. Oh, no; the New Orleans one **had nothing automatic.**
>
> "Q. But as far as applying the principle of controlling the mixture through the application of air and sending it to the higher point?
>
> "A. Oh, no. This (the later machine of the Webster Building) takes air on the bottom and top both." (R., p. 598.)

When Leake said the New Orleans experiment "had nothing automatic" he meant that it had no velocity nozzle. This is made clear by his next answer, which indicates that the New Orleans device was different from the later device of the Webster Building which "takes air on the bottom and top both."

Although Leake's testimony is vague throughout, the foregoing quotation from his deposition, together with the sketch, Defendants' Chicago Exhibit 127, makes it clear that the 1905 experiment in New Orleans was absolutely devoid of the most essential structural feature of the McMichael apparatus. Its lack of the velocity nozzle undoubtedly accounts for the fact that it was an abandoned failure.

The Documents Dated After McMichael's Filing Date Which the Ninth Circuit Court of Appeals Regards as Evidence that Leake Invented and Used the Invention of the Patent in Suit Before McMichael's Filing Date.

The Ninth Circuit Court of Appeals, being unable to find a particle of contemporaneous physical or documentary evidence corroborating Leake's testimony concerning the alleged prior use in 1905, quotes from a patent application of Leake, filed *after* McMichael's filing date as supposed corroboration of Leake's testimony concerning events said to have happened *before* McMichael's filing date, and the Circuit Court of Appeals for the Ninth Circuit regards a preliminary statement (affidavit) made by Leake in **1909** as acceptable corroboration of Leake's testimony concerning events said to have transpired in **1905**. The preliminary statement (R., p. 582) was filed in an interference between Leake and McMichael. The interference terminated favorably to McMichael, because petitioner, which eventually owned both applications, concluded that McMichael and not Leake was the inventor of the essential combination including the velocity nozzle. That the interference was properly terminated is demonstrated by the fact that Leake does not even claim to have conceived anything corresponding to the velocity nozzle before McMichael's filing date. Admittedly the 1905 experiment did not include it because the sketch which purports to illustrate the 1905 experiment is devoid of any such nozzle.

The only conceivable proper purpose to which the Leake preliminary statement could have been put in the present case would have been to impeach or discredit Leake as a witness. But as evidence to sustain the contention that Leake was a prior inventor, it is palpably in-

competent. Originating *after* McMichael's filing date, it cannot establish events *preceding* McMichael's filing date.

Furthermore, the Ninth Circuit Court of Appeals regards certain statements made in Leake's patent application in **1908**, by Leake's *attorney*, who did not even pretend to have first-hand knowledge of the facts, as competent evidence corroborating Leake's verbal testimony as to the alleged happenings in **1905**. The attorney was not called as a witness. These are simply laudatory statements[1] made by the attorney in behalf of his client. All of this argumentative laudation is consistent with the fact that Leake made the apparatus of his patent application *after McMichael's filing date*. The attorney did not say when Leake's use of his patent application machine was made. Yet the Ninth Circuit Court of Appeals regards the laudatory statements made in **1908**, after McMichael's filing date, as evidence that a device made in **1905** was practical and satisfactory.

There is no theory upon which the unsworn statements of Leake's patent attorney in an *ex parte* prosecution of a patent application can be considered competent evidence for or against either of the parties to this litigation.

In the Powers-Kennedy case the defendants attempted unsuccessfully to persuade the courts to give favorable consideration to the same kind of incompetent evidence which has been favorably considered by the Ninth Circuit Court of Appeals in this case. The Second Circuit Court of Appeals said:

> "The new defense of prior use was held by the district court not sufficiently proved; and with this we agree. This use was of a machine which Artingstall and Fanning said that they saw laying a con-

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1 These statements appear in the amendments, papers 5 and 9, of the Leake file-wrapper (Exhibit Book, pp. 367 and 378).

crete floor in 1903, subsequently changing the date to 1904. That was twenty-two years before they gave their testimony, and there was no documentary corroboration of any kind. *It is true that in 1918 Artinstall described very generally before a meeting of engineers that this process was practiced in 1903, but that can not be deemed documentary corroboration.*" (27 Fed. (2) 669.)

The Court of Appeals for the Ninth Circuit clearly erred when it accepted statements in Leake's 1909 preliminary statement, and laudatory statements made by Leake's attorney after McMichael's filing date, as corroborative of Leake's verbal testimony concerning the alleged experimental device of 1905.

This is the First Case in Which Any Federal Court of the United States Has Held that the Oral Testimony of an Alleged Prior Inventor or Prior User—Uncorroborated and Unsupported by Contemporaneous Writings, Drawings or Physical Exhibits—Is Sufficient to Invalidate an Issued Patent.

Such, however, was the decision of the Ninth Circuit Court of Appeals relative to the prior invention and use which the respondents claimed to have been made by Thomas S. Leake at New Orleans in 1905.

In support of the conclusion that the uncorroborated and unsupported deposition of Leake is sufficient to establish prior invention and use, the Ninth Circuit Court of Appeals cites the following cases:

Reed v. *Cutter*, 1 Story 590, 596.

C. F. Mueller Co. v. *A. Zeregas Sons*, 12 Fed. (2d) 517, 518.

Mayer v. *A. & H. G. Mutschler*, 248 Fed. 911, 914.

These cases do not support the proposition which they are cited to sustain.

Reed v. *Cutter*, 1 Story, 590, 596, in no way treats of the kind and degree of evidence required to establish prior invention or prior use. This case merely asserts the familiar rule that when a public use *has been* satisfactorily established, it makes no difference whether the use was known to a large number of people, or to only a few, or even to but one. But this well-known rule does not for a minute sustain the proposition that prior invention or use may be established, in the absence of any contemporary device or writing, by the *uncorroborated testimony of a single witness.*

C. F. Mueller Co. v. *A. Zeregas Sons*, 12 Fed. (2d) 517, 518. No patent was held invalid in this case bacause of any public use. The trial court had held three patents *valid*. The Court of Appeals found one of them, a design patent, invalid only because of lack of patentable subject-matter. The case involved a dispute between a patentee and a rival inventor, but the trial court resolved the dispute in favor of the patentee.

Mayer v. *A. & H. G. Mutschler*, 248 Fed. 911, 914. This case was cited by the Ninth Circuit Court of Appeals in support of the proposition that the testimony of one witness may be sufficient, but the cited case is readily distinguished from the case at bar by the following quotation from the opinion:

> "The rules as to prior use are severe and rightly so and Archbald is a witness hostile to plaintiff; *but the existence of the machine is not denied*, its date of erection *proved by other testimony than Archbald's*, as also is its unchanged condition, and still another witness swears that it was in 1911 as it is now."

Clearly the testimony of Leake in this case was not corroborated and supported as was the testimony of Archbald in the case cited.

Such are the cases cited by the Ninth Circuit Court of Appeals in support of the startling conclusion that the oral testimony of Leake, given 22 years after the fact, may be accepted without corroboration or contemporaneous evidence of any character to defeat what otherwise is a valid and valuable patent.

The Law as to Proof of Alleged Prior Public Use of a Patented Invention.

It is well settled that to invalidate an issued patent a prior use must be proved "by evidence so cogent as to leave no reasonable doubt."

Perhaps the leading authority is *Deering* v. *Winona Harvester Works,* 155 U. S. 286, in which the court said (p. 300):

> "As we have had occasion before to observe oral testimony, unsupported by patents or exhibits, tending to show prior use of a device regularly patented, is, in the nature of the case, open to grave suspicion. *The Barbed Wire Patent,* 143 U. S. 275. Granting the witnesses to be of the highest character, and never so conscientious in their desire to tell only the truth, the possibility of their being mistaken as to the exact device used, which, though bearing a general resemblance to the one patented, may differ from it in the very particular which makes it patentable, are such as to render oral testimony peculiarly untrustworthy; particularly so if the testimony be taken after the lapse of years from the time the alleged anticipating device was used. If there be added to this a personal bias, or an incentive to color the testimony, in the interest of the party calling the witness, to say nothing of downright perjury, its value is of course, still more seriously impaired. *This case is an apt illustration of the wisdom of the rule requiring such anticipations to be proven by evidence so cogent as to leave no reasonable doubt in the mind of the court,* that the transaction oc-

curred substantially as stated. The very exhibit produced by the witness Heller contradicted, so far as it could contradict, his testimony, and the witness who ought to have corroborated his story, gave a version which showed it to be untrue in more than one important particular."

This holding, as to the degree of proof required to establish a prior use, has been reiterated by the Supreme Court in recent cases. *Adamson* v. *Gilliland,* 242 U. S. 350, 1917; *T. H. Symington Co.* v. *National Malleable Castings Co.,* 250 U. S. 383, 1919, and *Eibel Process Co.* v. *Minnesota & Ontario Paper Co.,* 261 U. S. 45, 1923.

In the Eibel case, the latest pronouncement of the Supreme Court on the proof required to establish prior use, the court said (p. 60):

> "It is true that some witnesses testify that they realized before Eibel's application that speeding up the stock to equal velocity with the wire would solve the difficulty and aid the speed. But there is not a single written record, letter or specification of prior date to Eibel's application that discloses any such discovery by anyone, or the use of the pitch of the wire to aid the speed of the machine. *The oral evidence on this point falls far short of being enough to overcome the presumption of novelty from the granting of the patent.* The temptation to remember in such cases and the ease with which honest witnesses can convince themselves after many years of having had a conception at the basis of a valuable patent, are well known in this branch of law, and have properly led to a *rule that evidence to prove prior discovery must be clear and satisfactory.*"

T. H. Symington Company v. *National Malleable Castings Company et al.,* 250 U. S. 383, 386:

> "This court has pointed out that oral testimony tending to show prior invention as against existing letters patent is, in the absence of models, drawings, or kindred evidence, open to grave suspicion; par-

ticularly if the testimony be taken after the lapse of years from the time of the alleged invention. *Deering* v. *Winona Harvester Works*, 155 U. S. 286, 300."

The Most That Can Be Said for Leake's 1905 Device Is That It Was a Discarded and Abandoned Experiment.

The alleged 1905 experiment of Leake was unquestionably discarded and abandoned almost immediately after it was made.

Leake says:

"A. No; that was nothing but a crude machine put up there to see whether I could put concrete up in the air.

"Q. What happened after you used that?

"A. I tore it down.

"Q. Did you keep that?

"A. No. It was nothing only a lot of two by four stuff put up with hoops.

"Q. So that is not in existence now?

"A. Oh, no.

"Q. Do you know of any other pictures or blueprints of that device other than the one you have referred to here?[1]

"A. No." (R., p. 586.)

This is the Leake device which the Ninth Circuit Court of Appeals credits as a prior public use of McMichael's successful combination of elements.

In striking contrast, the Second Circuit Court of Appeals in the Powers-Kennedy case says:

"It is one thing to say that a continuous use to date may be found on oral testimony to have started at a given time, and quite another to say that such testimony is enough when it describes only a casual

[1] The "one you have referred to here" is the sketch made by Leake himself in connection with his testimony in 1927 (Exhibit Book, pp. 693, 694).

use, abandoned thereafter, and never entering into the art until after the patent in suit was applied for. . . . *Such casual and abandoned uses do not contribute to the stock of knowledge which makes up the art. If we may invalidate a patent upon such prior uses so proved, no patent would be safe.*" (27 Fed. (2) 670.)

The language of the Second Circuit Court of Appeals is particularly applicable to Leake's casual and abandoned experiment of 1905. Leake *after* McMichael's filing date did apply for a patent. Leake's patent application, however, was essentially different from his abandoned experiment of 1905. The patent application included McMichael's essential velocity nozzle. The abandoned experiment of 1905 did not include that essential element. This, we think, was the salient reason why Leake's 1905 experiment was an abandoned failure and why the world had to wait for McMichael to produce a practical pneumatic concrete placer.

These Suits Involving the McMichael Patent Are Distinguished From Concrete vs. Gomery, 269 U. S. 177.

The structure of the Callahan patent involved in the Gomery case was *not new*. What Callahan did was to apply an old and substantially unchanged machine to a new use, *i. e.*, the gravitation of concrete through inclined chutes. This court held the Callahan patent invalid.

But the machine of the McMichael patent is a *new machine*. Nowhere in the prior art can there be found a machine which comprises a velocity nozzle acting upon a mass of concrete at the point where it is compacted in passing from a container into a discharge conduit. Therefore, there is not in the prior art a single machine capable of handling concrete as it is handled by the McMichael machine. Since the machine of the McMichael patent is a

new machine, both structurally and in the manner of its operation, it follows that the rule in the Gomery case does not apply.

The Court of Appeals for the Second Circuit was clearly right when, in the Powers-Kennedy case, it distinguished the McMichael patent from the rule in the Gomery case, and Judge Bourquin and the Ninth Circuit Court of Appeals erred in holding to the contrary.

McMichael's Original Application Adequately Supported the Claims in Suit—No Supplemental Oath Was Necessary.

It is, of course, true that McMichael, during the prosecution of his application, largely rewrote and amplified its descriptive part more accurately to set forth his *method* and *theory* of operation. But never at any time did McMichael add to or detract from the *apparatus* shown in his patent drawing. The apparatus is identically the same as it was when the application was filed on January 14, 1907.

If *method claims* were involved in this suit, as was the case in the Eastern suits, the amendments to the specification pertaining to *methods* and theories would undoubtedly require the same careful consideration which was given to them by the judges in the Eastern cases. And in passing upon the method claims now before this court in the Powers-Kennedy case, we are confident that your Honors will agree with the opinion of Judge Learned Hand in the Ulen case, citing *Westinghouse* v. *Metropolitan*, 290 Fed. 661 (Exhibit Book, p. 15), that no adequate defense, even as to *method claims*, can be predicated upon the file-wrapper history of the McMichael application.

But in this case, *apparatus claims* only are involved.

No matter how many times McMichael may be said to have changed his *theories* or ideas as to *method*, the *apparatus* always has been and now is the identical apparatus which was illustrated by McMichael in his original application.

Since McMichael never in any way changed the illustration of his apparatus, it follows that no supplemental oath was at any time necessary to support the apparatus claims involved in this case. Although such a supplemental oath was filed, and was perhaps desirable from the standpoint of McMichael's *method claims*, the fact is that such supplemental oath is mere surplusage so far as the *apparatus claims* involved in this case are concerned.

It will also be observed that claim 3 of the original application covers substantially the same subject-matter as some of the claims (see claim 2) of the patent.

Tested by the Rule Laid Down by This Court in the Eibel Process Case, the McMichael Patent is Entitled to Liberal Construction.

In the case of *Eibel Process Co.* v. *Minnesota & Ontario Paper Co.*, 261 U. S. 45, 63; 43 Sup. Ct. Rep. 322, Mr. Chief Justice Taft says:

> ". . . **In administering the patent law the court first looks into the art to find what the real merit of the alleged discovery or invention is, and whether it has advanced the art substantially. If it has done so, then the court is liberal in its construction of the patent, to secure to the inventor the reward he deserves.** If what he has done works only a slight step forward, and that which he says is a discovery is on the border line between mere mechanical change and real invention, then his patent, if sustained, will be given a narrow scope, and infringement will be found only in approximate copies

of the new device. It is this differing attitude of the courts toward genuine discoveries and slight improvements that reconciles the sometimes apparently conflicting instances of construing specifications and the finding of equivalents in alleged infringements."

Tested by the rule above laid down, the McMichael patent is entitled to liberal construction—easily a construction which will sustain the patent and include the respondents' devices.

That the McMichael apparatus possesses great merit and that it did greatly advance the art of concrete placement cannot seriously be denied. It is the only machine that has ever been successfully used in placing concrete in inaccessible forms, such as those used in lining tunnels. It has been used on practically every important tunnel project in recent years. It has rendered obsolete the hand placement of concrete in tunnel linings. It eliminates the necessity for hand tamping, and packs the concrete which it places much more compactly than any amount of hand tamping could possibly accomplish. It has saved hundreds of thousands of dollars to the builders of tunnels.

No practical substitute for McMichael's essential combination and arrangement of parts has ever been proposed. Now, many years after McMichael's invention, respondents, in order to line a tunnel successfully, are obliged to use each and every element of McMichael's patented combination in exactly the way taught by McMichael, that is to say, so that the *velocity nozzle acts upon the concrete at the very point where it is compacted in passing, under the pressure behind it, from the converging walls of the container into the conduit.*

McMichael's Patent for An Invention of Merit Not Anticipated by Theoretical Modifications of Earlier Devices.

Among all the prior patents relied upon by the respondents in this case there is not shown a single device which without modification, can be made successfully to handle ordinary concrete pneumatically. There is in the prior patents no device which handles concrete as does the McMichael machine, that is to say, by first compacting a mass of concrete at the junction of container and conduit and then acting upon the compacted mass with a velocity nozzle. For the respondents to say now, in the light of McMichael's invention, that it would be possible, or even easy, to provide some one of the prior devices with a velocity nozzle located where and for the purpose taught by McMichael, and otherwise to modify these old devices to make them more or less like McMichael's successful machine, is insufficient.

The leading Supreme Court case on this point is *Topliff* v. *Topliff*, 145 U. S. 156, 161; 36 L. Ed. 658; 12 S. C. 825, wherein Mr. Justice Brown makes the statement:

> "It is not sufficient to constitute an anticipation that the device relied upon might, by modification, be made to accomplish the function performed by the patent in question, if it were not designed by its maker, nor adapted, nor actually used, for the performance of such functions."

The Exercise of Invention by McMichael in Producing His Successful Machine Is Not Negatived by the Simplicity of His Structure or Because That Which He Did May Seem Obvious in the Light of His Achievement.

Although the McMichael machine is necessarily a bulky apparatus, its construction is extremely simple. The construction is simple because McMichael ascertained exactly what was necessary. He provided what was necessary and no more. But simple as is McMichael's construction, nothing like it is to be found in the prior art. The mere simplicity of McMichael's machine is evidence that he made an invention of a high order.

In the case of *Diamond Rubber Co.* v. *Consolidated Tire Co.*, 220 U. S. 428, 435, the Supreme Court, by Mr. Justice McKenna, said:

> "Knowledge after the event is always easy, and problems once solved present no difficulties, indeed, may be represented as never having had any. . . . But the law has other tests of the invention than subtle conjectures of what might have been seen and yet was not. *It regards a change as evidence of novelty the acceptance and utility of change as a further evidence, even as demonstration.*"

As far back as the early case of *Sickles* v. *Gloucester Mfg. Co.*, 1 Fish. 222, the courts have said:

> "But it is not an unusual case, even among learned engineers, to see a thing after it is done, which never occurred to their minds before. I am disposed to distrust that wisdom which succeeds the event."

In the case of *Webster Loom Co.* v. *Higgins*, 105 U. S. 580, 591, in which case it was urged that the production of the meritorious invention there in suit was but an

obvious modification of a previous invention, this court said:

> "But it is plain, from the evidence and from the very fact that it was not sooner adopted and used, that it did not, for years, occur in this light to even the most skilful persons. It may have been under their very eyes, they may almost be said to have stumbled over it; but they certainly failed to see it, to estimate its value, and to bring it into notice. Who was the first to see it, to understand its value, to give it shape and form, to bring it into notice and urge its adoption, is a question to which we shall shortly give our attention. At this point we are constrained to say that we cannot yield our assent to the argument, that the combination of the different parts or elements for attaining the object in view was so obvious as to merit no title to invention. *Now that it has succeeded, it may seem very plain to anyone, that he could have done it as well. This is often the case with inventions of the greatest merit.*"

The Opinion of the Supreme Court in the Grant Tire Case Is Particularly Applicable to the Case at Bar.

In the case of *Diamond Rubber Co.* v. *Consolidated Rubber Tire Co., supra,* the Supreme Court said:

> "The prior art was open to the rubber company (defendant). That 'art was crowded,' it says, 'with numerous prototypes and predecessors' of the Grant tire, and they, it is insisted, possessed all of the qualities which the dreams of experts attributed to the Grant tire. And yet the rubber company uses the Grant tire. It gives the tribute of its praise to the prior art; it gives the Grant tire the tribute of its imitation, as others have done. And yet the narrowness of the claims seemed to make legal evasion easy. Why, then, was there not evasion by a variation of the details of the patented arrangement. Business interests urged to it as much as to infringement. We can find no answer except that given by the tire company:

> " 'The patented organization must be one that is essential. Its use in the precise form described and shown in the patent must be inevitably necessary.' "

In the case at bar the respondents say the conveyor art was crowded and that McMichael's machine had many prototypes in the prior art, as for example, the unused and unusable contraption of the old Smith patent No. 122,498 of 1872, the mud pumps of the Duckham British patents, the kinetic conveyor of the Kolsche German patent, etc. And to these devices of the prior art the respondents give the tribute of their praise. But to the McMichael patent they pay the tribute of imitation, as did the defendants in the Ulen and Powers-Kennedy cases.

It would have been easy for the respondents to have avoided McMichael's claims, if McMichael's specific combination did not possess some peculiar advantage which was desired by his imitators. They could have left out McMichael's velocity nozzle, or they could have placed a nozzle somewhere other than where McMichael taught that it should be placed, *i. e.*, at the specific place where the concrete is compacted in passing from the tapering walls of the container into the conduit. But no! Rather than risk in their business the insufficient combinations of the prior art, the respondents chose to risk this suit and place their velocity nozzle just where McMichael taught that it should be placed, and otherwise appropriate the essential elements of McMichael's combination.

It can be said of McMichael's combination or organization, just as it was said by this court with respect to the Grant tire:

> **"The patented organization must be one that is essential. Its use in the precise form described and shown in the patent must be inevitably necessary."**

A New or Better Theory of Operation Properly May Be Added to a Specification in the Prosecution of An Application for Patent.

At the time McMichael filed his application for patent, his apparatus was new. Even McMichael had had very little experience with it. He knew that it would do something which no prior device had ever done. It would successfully handle concrete pneumatically. Doubtless his *theories* as to the functioning of the machine were incomplete or even faulty. But that is immaterial. It is the thing and its results which count. The theory is unessential.

When McMichael filed his application, he did all that the law requires. He illustrated his essential combination and taught the world how to use it. His combination of parts has not been altered in any substantial respect since his application was filed. In the years following the filing of his application, it was inevitable that McMichael and his associates, upon the basis of their practical experience with his machine, should evolve some *theories* as to why his apparently very simple structure would do something which engineers had always considered impossible of successful accomplishment, *viz.*, the transportation of concrete without separation of its aggregates. When the theories were formulated, they were included in the patent specification, and properly so, because they are instructive to persons skilled in the art.

In the case of *Hobbs* v. *Beach*, 180 U. S. 383, 45 L. Ed. 586, the Supreme Court by Mr. Justice Brown, said:

> "The patent had been the subject of an earnest contest in the Patent Office for four years; had been put in interference with five other devices, and it was scarcely possible that, after this long litigation, the patentee should not have detected defects in his original application, and have taken this opportunity

of correcting them. His experience in this litigation had doubtless apprised him of the weak points in his prior specification and claims, and it was perfectly competent for him to restate them, provided his patent was not essentially broadened to cover intervening devices."

And in the case of *Diamond Rubber Co.* v. *Consolidated Rubber Tire Co.*, 220 U. S. 428, 435, the Supreme Court said:

"A patentee may be baldly empirical, seeing nothing beyond his experiments and the result; yet if he has added a new and valuable article to the world's utilities, he is entitled to the rank and protection of an inventor. And how can it take from his merit that he may not know all of the forces which he has brought into operation? It is certainly not necessary that he understand or be able to state the scientific principles underlying his invention, and it is immaterial whether he can stand a successful examination as to the speculative ideas involved. . . . (Citing numerous cases.) . . . He must, indeed, make such disclosure and description of his invention that it may be put into practice. In this he must be clear. He must not put forth a puzzle for invention or experiment to solve, but the description is sufficient if those skilled in the art can understand it. This satisfied the law, which only requires as a condition of its protection that the world be given something new and that the world be taught how to use it. It is no concern of the world whether the principle upon which the new construction acts be obvious or obscure, so that it inheres in the new construction." (55 L. Ed. 527, 530.)

See also *Cleveland Co.* v. *Detroit Co.*, C. C. A., 6th, 131 Fed. 853, 857, wherein claims based on a better understanding of the invention obtained during the prosecution of the application, were upheld.

The Fact That the Respondents Have a Later Patent Under Which They Purport to Operate Is Not in Any Degree Indicative of Non-Infringement.

Hackley, respondents' expert, who was also superintendent of the infringing operations in the Skagit tunnel, has a patent (Exhibit Book, p. 78) upon certain details of machine which unquestionably embodies all of the essential features covered by McMichael's earlier and more fundamental patent. The grant of the later and narrower patent does not create the slightest presumption that the structure therein shown avoids infringement of the earlier and broader patent.

In the case of *Herman* v. *Youngstown Car Mfg. Co.*, 191 Fed. 579, 584, the Circuit Court of Appeals for the Sixth Circuit by Judge Denison, said:

> "Defendant's device is manufactured under patent No. 765,406, issued July 19, 1904, to J. H. Wagenhorst, and the court below gave to this fact some force in reaching his conclusion that the device did not infringe. **We think that the granting of the later patent and defendant's conformity thereto are not of importance in this case on the infringement issue.** There are expressions in some reported cases implying that by the later patent the government has granted a right to make and use the article so patented and that such grant is inconsistent with any construction of the earlier patent which would forbid the manufacture of the later structure. Such implication rests on a fundamental error. A patent is not the grant of a right to make or use or sell. It does not, directly or indirectly, imply any such right. It grants only the right to exclude others. The supposition that a right to make is created by the patent grant is obviously inconsistent with the established distinctions between generic and specific patents, **and with the well-known fact that a very considerable portion of the patents granted are in a field covered by a former relatively generic or basic patent, are tributary to such earlier patent, and cannot be practiced unless by license thereunder.**"

Conclusion.

McMichael provided the first pneumatic apparatus which would successfully transport and place the heavy non-flowing heterogeneous material commonly known as concrete. His invention has met with unusual success. It has entirely supplanted the hand placement of concrete in the arches of tunnels, subways and similar projects.

Prior to the McMichael invention persons familiar with the characteristics and requirements of concrete believed that it could not possibly be transported through pipes by air pressure without separating its aggregates or without mixing it with so much water as to entirely ruin it. McMichael solved the problem because his machine was constructed to operate in accordance with a plan or principle which was entirely new in the pneumatic conveyor art. He did not apply any old machine to a new use. By an extremely simple arrangement of elements co-operating in a novel manner he produced a new machine having a novel mode of operation,—he transported concrete pneumatically in a way that neither concrete nor any other material had ever been conveyed before.

The decree of the Ninth Circuit Court of Appeals should be reversed.

Respectfully submitted,

LYNN A. WILLIAMS,
CLIFFORD C. BRADBURY,
ALBERT G. MCCALEB,
For Petitioner.

STEPHEN J. COX,
Of Counsel.

APPENDIX

CONTAINING

I. A chart (and comment) showing the presence of the "Velocity Nozzle" in concrete placers made **after** McMichael's invention and the absence of such a nozzle from every one of the prior art structures.

II. A discussion of the experts' tests of the "Slug Theory."

APPENDIX

CONTAINING

I. A chart (non-commental) showing the presence of the "Velocity Nozzle." In congruent planes made after Mr. Michael's invention and the absence of such a nozzle from every one of the prior art structures.

II. A discussion of the experts' tests of the "Slug Theory."

THE VELOCITY NOZZLE.

It Acts Upon the Concrete Which Is Compacted Into the Outlet Where the Conduit and the Tapering Walls of the Container Merge.

It is An Indispensable Feature of Petitioner's Commercial Machine, Each of Respondents' Machines, and Each of the Two Machines Heretofore Held to Infringe the McMichael Patent.

It is Not Disclosed By a Single One of the Prior Art Machines on Which the Respondents Rely.

For the convenience of the court, we are inserting at this point a chart whereon, in the upper row, appear the machines which embody the McMichael invention, and upon which the claims in suit are readable. In the lower row appear the principal prior art devices upon which the respondents rely.

Each of the machines of the upper row, namely, the device of the McMichael patent, petitioners' commercial embodiment of the McMichael invention, respondents' devices, and the devices which were held to infringe in the Ulen and Powers-Kennedy cases, employs a *velocity nozzle* at the very point where McMichael taught that it should be placed, viz., at the point where the concrete tends to arch and jam in passing from the tapering portion of the chamber into the discharge conduit. The claims in suit accurately describe these machines. Each is a successful concrete placing machine, because it embodies every element of McMichael's essential combination. Each would fail as a concrete placer if it were stripped of its velocity nozzle.

No one of the several prior art machines in the lower row comprises a velocity nozzle. Thus it conclusively appears that no one of these prior art devices anticipates the claims in suit, because each and every of the claims clearly and definitely calls for the velocity nozzle.

The devices shown in the upper row represent successful concrete placing machines made **after** McMichael's invention and in accordance with his teaching.

The devices shown in the lower row cannot successfully be used for placing concrete. Why? One sufficient reason why they cannot be so used, is because each and every of these prior art devices is without a velocity nozzle. Being without McMichael's essential nozzle, these prior devices cannot function as does the McMichael apparatus and cannot afford the results which were afforded for the first time when McMichael invented his essential combination.

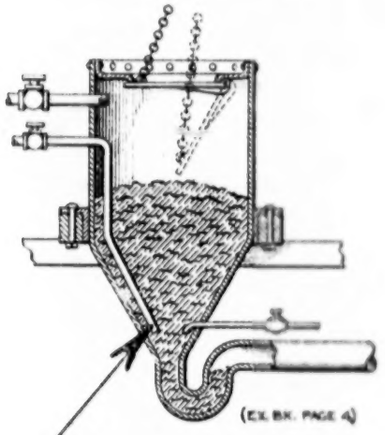
It is indeed significant, in fact conclusive so far as this case is concerned, that defendants use McMichael's essential combination, velocity nozzle and all, exactly as called for by the claims in suit. No one does or can successfully use the devices of the prior art for placing concrete. Can it fairly be said that these devices of the "prior art," totally lacking the velocity nozzle among other things, are sufficient to meet respondents' exigencies in this case, when they are insufficient to meet their requirements in practical tunnel lining operations? We submit that the answer to this question is "No."

The device of the Leake sketch, which is reproduced on the chart, is not a part of the prior art because not proved. However, even if in the prior art it would be of no importance in this case. It had no velocity nozzle. Therefor it was an abandoned failure.

MACHINES W

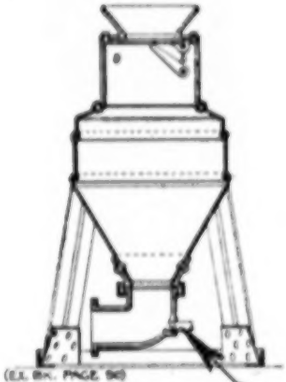
Each of These Machines Has a Velocity

McMICHAEL PATENT.



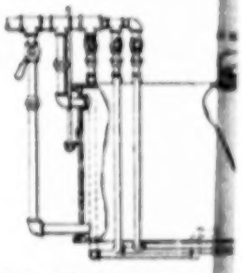
(EX. BK. PAGE 4)

PETITIONER'S COMMERCIAL MACHINE.



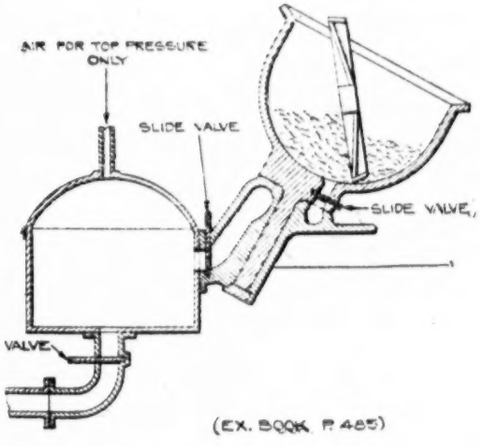
(EX. BK. PAGE 96)

RESPONDENT'S
(Seen by Oxo



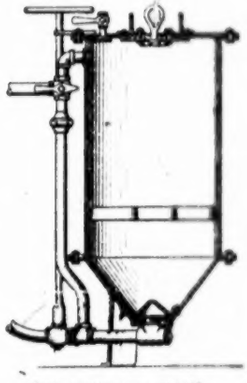
(EX. BK. PAGE 64)

SMITH PATENT #122498.



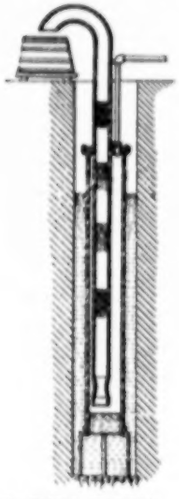
(EX. BOOK P. 485)

CANNIFF PATENT #873345



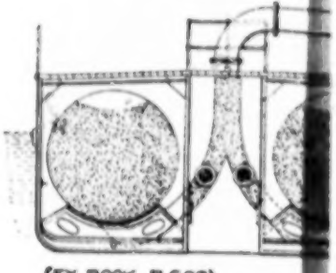
(EX. BOOK P. 544)

SAUNDERS PATENT #597023
(WATER LIFT).



(EX. BOOK P. 572)

DUCKHAM BRITISH PAT

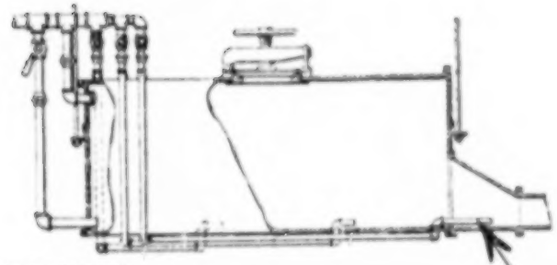


(EX. BOOK P. 603)

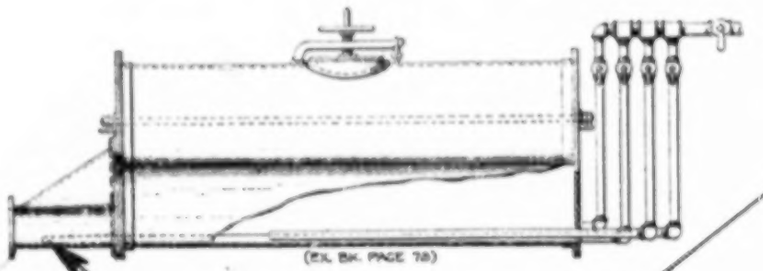
MACHINES WHICH EMBODY THE McMICHAEL INVENTION.

se Machines Has a Velocity Nozzle Discharging Where the Concrete Is Compacted in Passing From the Container into the Conduit.

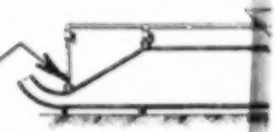
RESPONDENTS' EARLY DEVICE.
(Seen by Oxenham on Oct. 10, 1923).



THE DEVICE OF THE HACKLEY PATENT.
(Also Used on Skagit River Job).



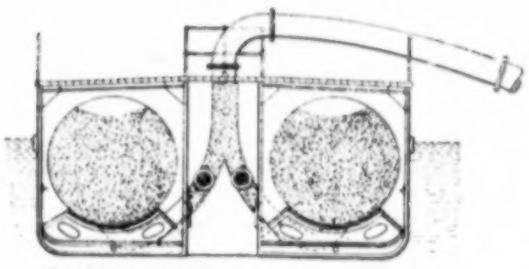
DEVICE HELD TO INFR



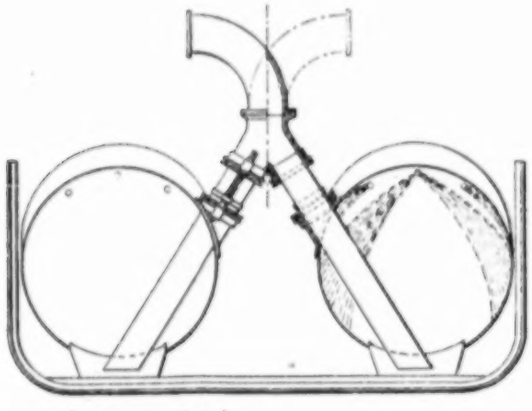
THE VELOCITY NOZZLE

—THE PRIOR ART MACHINES—

DUCKHAM BRITISH PATENT #4400-1875.

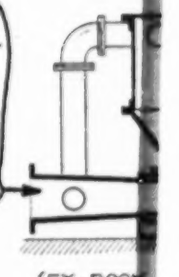


DUCKHAM BRITISH PATENT #15348-1885.



KOLSCHE GERMA

A BLOWER (FAN) CONNECTS HERE TO CREATE A CURRENT WHICH PICKS UP AND CARRIES IN SUSPENSION PARTICLES DROPPING FROM THE HOPPER.

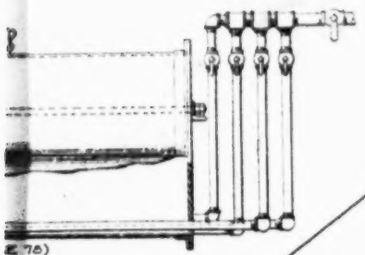


NOT A SINGLE PRIOR ART MACHINE HAS A "VELOCITY NOZZLE"

'ENTION.

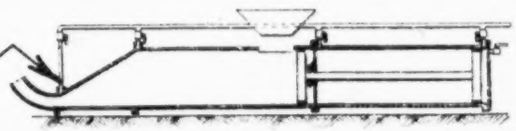
ıssing From

.OKLEY PATENT.
. River Job).



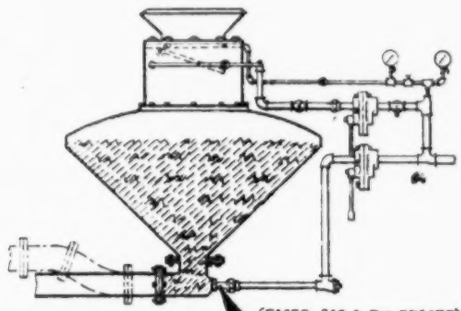
E 78)

DEVICE HELD TO INFRINGE IN ULEN CASE.



(PAGE 181 – ULEN RECORD)

DEVICE HELD TO INFRINGE IN POWERS-KENNEDY CASE.



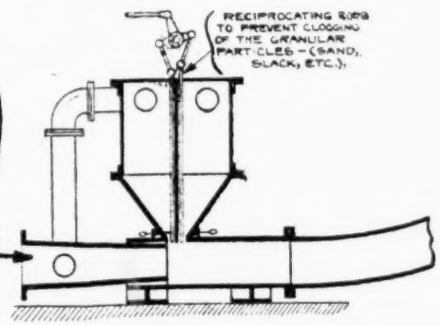
(PAGES 382-3 RK. RECORD)

:S —

348-1885.

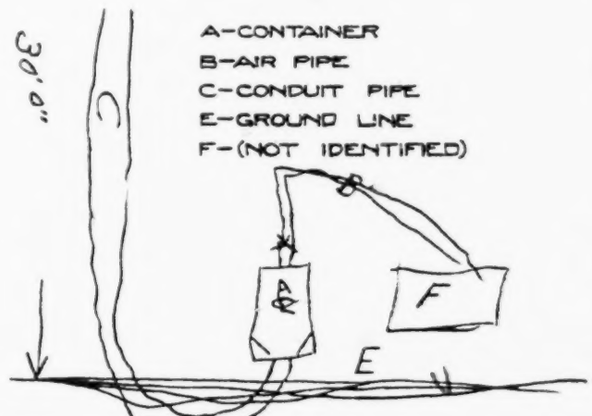
KOLSCHE GERMAN PATENT #18394-1881.

A BLOWER (FAN) CONNECTS HERE TO CREATE A CURRENT WHICH PICKS UP AND CARRIES IN SUSPENSION PARTICLES DROPPING FROM THE HOPPER.



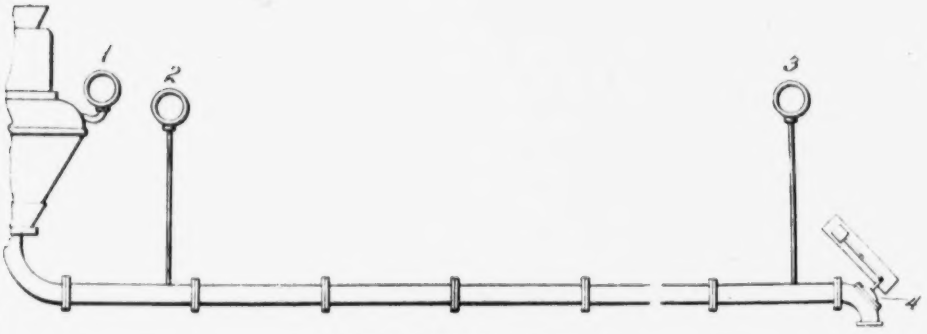
(EX. BOOK P. 659)

LEAKE'S 1927 SKETCH OF ALLEGED 1905 NEW ORLEANS DEVICE A FAILURE – NO VELOCITY NOZZLE.

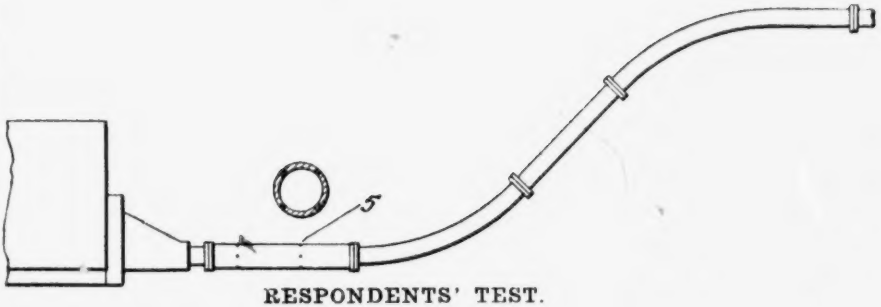


DEFTS' PHYSICAL EX. 127

PLATE ONE.



PETITIONER'S TEST.



RESPONDENTS' TEST.

A DISCUSSION OF THE EXPERTS' TESTS OF THE "SLUG THEORY."

Experts for the respondents and an expert for the petitioner made tests to determine the mode of operation of respondents' and petitioners' machines, particularly with respect to the presence or absence of slugs. Petitioner contends that the only reasonable interpretation of these tests conclusively proves the presence of slugs of almost identical characteristics in both of these tests.

On Plate One are diagrammatic illustrations of petitioners' (above) and respondents' (below) apparatus for conducting these respective tests. Each used full-sized commercial concrete machines which should have given like results.

Petitioner contends that the respondents' experts were led to the conclusion that respondents' machine did not deliver its charge in slugs by an erroneous reading and interpretation of respondents' records.

Respondents' test consisted in measuring instantaneous resistance changes between electrodes 5 (Plate One) positioned in the wall of an insulating section of the discharge pipe as a charge of concrete and air was passed through the pipe.

Petitioner's test consisted in measuring instantaneous pressures at successive positions along the discharge pipe and also measuring the impact pressure at an elbow at the end of the discharge pipe as a charge of concrete and air was passed through the pipe.

Respondents' Test.

On Plate Two is a diagrammatic showing of the oscillograph and its connections used in respondents' test. Electrodes D and A near the top of the pipe section (lower right center Plate Two) were connected to one oscillograph "Element No. 2" and electrodes C and B were connected to another "Element No. 3," suitable batteries being included in their circuits. A third "Element No 1" of the oscillograph was connected to a 60 cycle alternating current source to provide a record of elapsed time. The film which in this case was a photographic film 3¼ inches wide, was arranged to move at a substantially constant rate of speed in the direction shown by the arrow at the upper left-hand corner of Plate Two. Defendants' Exhibit 189, is a photographic copy of the oscillograph film which recorded respondents' test.

On Defendants Exhibit 189 the horizontal lines marked A to D and B to C at the left of the strip are base lines traced on the film by spots of light reflected from tiny mirrors mounted upon the oscillograph elements 2 and 3. These elements are suspended in strong magnetic fields. The beams of light from these mirrors are deflected proportionately to the currents passing through the elements just as the pointer of an ammeter is deflected proportionately to the current which passes through its coil excepting that the elements and mirrors of an oscillograph are made so light that they respond to rapid variations of current.

At a position about 9 inches from the left end of Defendants' Exhibit 189, when the rubber pipe was wet by the passage of the first slug of wet concrete, the resistance between electrodes A and D became reduced to the same extent as that between electrodes B and C and the beams of

PLATE TWO

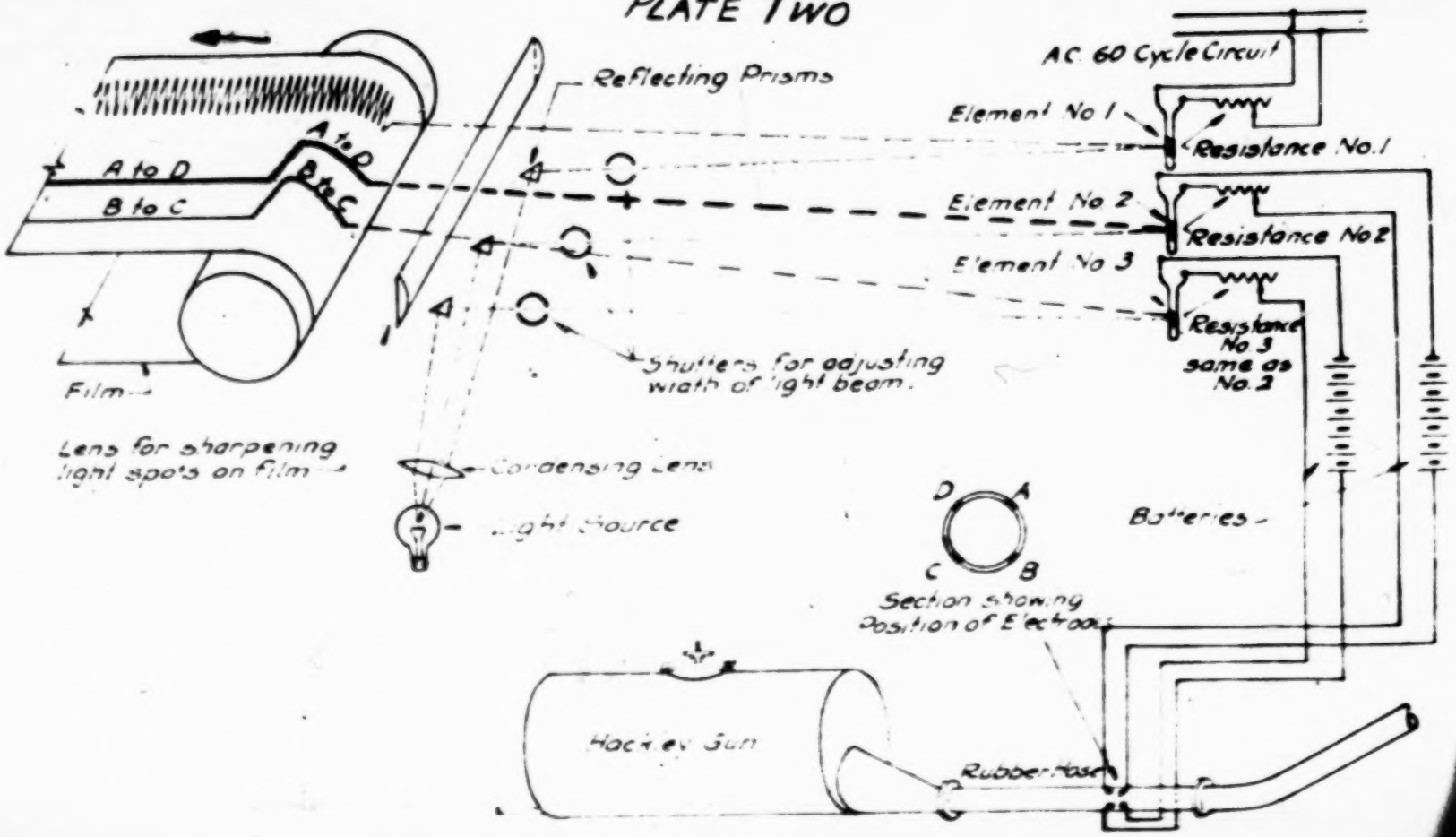
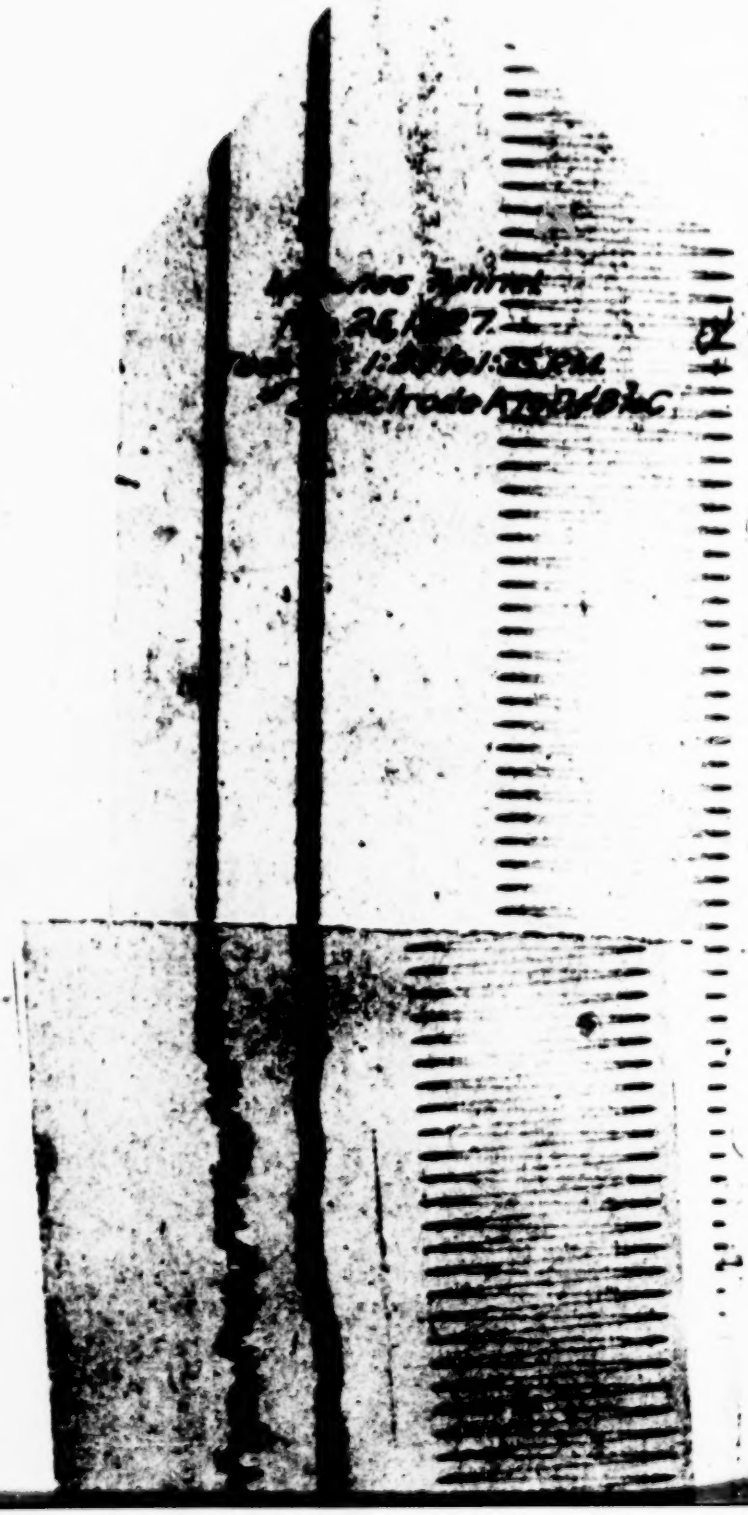

AC 60 Cycle Circuit
Reflecting Prisms
Element No 1
Resistance No.1
A to D
B to C
A to B
B to C
Element No 2
Resistance No 2
Element No 3
Resistance No 3 same as No 2
Shutters for adjusting width of light beam.
Film
Lens for sharpening light spot's on film
Condensing Lens
Light Source
D
A
C
B
Batteries
Section showing position of Electrodes
Hackley Gun
Rubber Hose

PLATE THREE



light were consequently deflected so as to trace new paths upon the moving photographic film. It is here that respondents' experts were deceived. Because the base line A to D, Defendants' Exhibit 189, appeared to extend to the right without an offset at the position 9¼ inches from the left end of line marked A to D, they concluded that the top line to the right of the offset was traced by the same mirror which traced the bottom line to the left of the offset and that the bottom line to the right of the offset was traced by the mirror which traced the top line to the left of the offset.

A careful inspection of Defendants' Exhibit 189, however, shows from the quality and characteristics of the lines traced to the left and to the right of the offset that the top line to the right of the offset is traced by the same spot of light which traced the top line to the left of the offset and that the bottom line to the right of the offset is traced by the same spot of light which traced the bottom line to the left of the offset. The width and brightness of the lines to the left and right of the offset afford a means of comparison which is conclusive that the top line to the right of the offset is traced by the same mirror as the top line to the left and that the bottom line to the right of the offset is traced by the same mirror as the bottom line to the left.

Plate Three was produced by making a fold in Defendants' Exhibit 189 at a position exactly 17⅝ inches to the right of the offset and superimposing the part of Defendants' Exhibit 189 where this fold is made upon the base lines and then photographing the fold. The distance of 17⅝ inches was selected because this is the first position at which the lines to the right of the offset are found to extend for any appreciable time the same distance apart as they were before being offset. If Defendants' Exhibit 189 is folded at the position 17⅝ inches to the

right of the offset and laid back upon the base lines the identity of the lower line to the right with the lower line to the left and the upper line to the right with the upper line to the left will be instantly apparent.

Another proof of respondents' experts' erroneous interpretation of Defendants' Exhibit 189 is that the lower line to the right of the offset has portions which drop below the upper base line to the left of the offset. This could not happen with the use of batteries connected as shown on Plate Two. (Plate Two is a copy so far as the battery connections are concerned, of a plate of respondents' brief before the Ninth Circuit Court of Appeals.) Perhaps the most conspicuous position at which the lower line to the right of the offset drops below the upper base line to the left of the offset is at 27 inches to the right of the offset. The condition may be seen clearly, however, right at the offset where the lower line to the right drops about 1/16 of an inch below the lower edge of the upper base line.

Petitioner's Test.

As the concrete is discharged from the petitioner's machine shown at the top of Plate One, if slugs are formed there will be pressure gauge indications of the passage of the slugs past the connections of the gauges with the pipe line. In order that a slug may move through the pipe line a greater pressure must exist behind the slug than that immediately in front of it. It is this differential of pressure which moves the slug through the pipe line. By having gauges 2 and 3 and the mass recorder 4 synchronized by a half-second time indicator, pressure waves in the pipe line as they occur on the gauge 2 and on the gauge 3 can be traced with particular reference to the time when a mass impinges upon the mass recorder 4

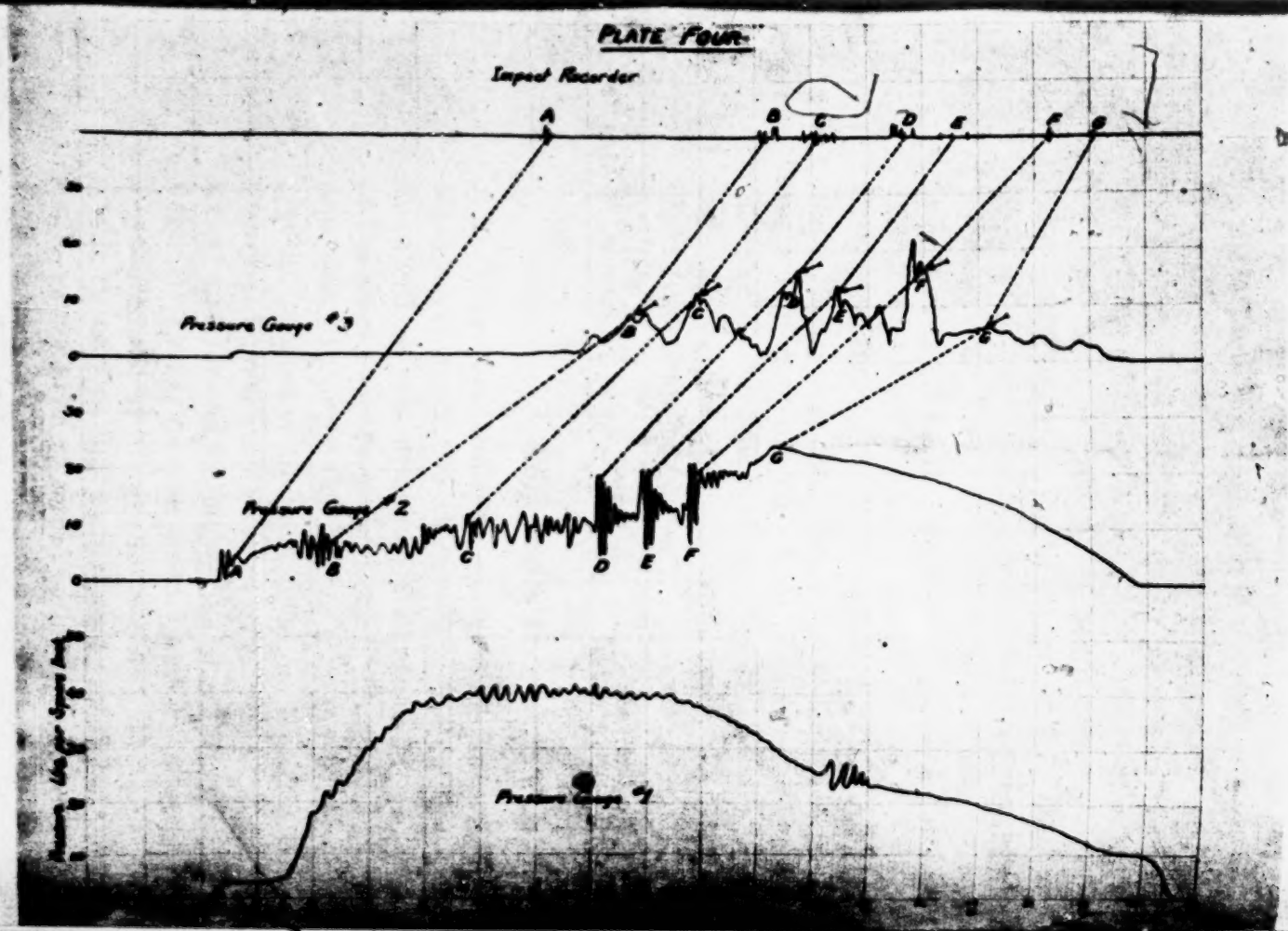


PLATE FOUR
Impact Recorder
A
B
C
D
E
F
G
Pressure Gauge #3
Pressure Gauge #2
Pressure Gauge #4

as the concrete turns around the bend at the discharge end of the pipe.

Four separate discharges from the petitioner's machine were recorded, the actual original records being introduced as Plaintiff's Exhibit 207; but the real information of what happened in the pipe line can be had most accurately from an inspection of Plaintiff's Exhibit 206, which comprises a plurality of composite records of all the recording devices and from which can be seen at a glance just what was occurring in the pipe line. These exhibits were made up by petitioner's expert, Mr. Ray, by taking readings off of the original gauge and mass recording dials and tape. One sheet forming part of Plaintiff's Exhibit 206 is reproduced herewith as Plate Four. (This sheet as shown in Plate Four is modified by the addition of the diagonal lines indicating slugs.) The vertical lines of this plate indicate half-second divisions of time as recorded by a swinging pendulum which made and broke an electric circuit connected with the time recording devices of all of the instruments.

Commencing at the beginning of the discharge of a batch of concrete, the lower line is a record of gauge No. 1 showing the air pressure on top of the concrete in the receiver. The next higher line shows the air pressures on gauge No. 2; the next the air pressures on gauge No. 3; and the top line the mass deflections on the mass recorder.

By reference to this chart, the total number of masses passing through the discharge pipe can be counted, the speed of travel of certain masses can be observed. The fact that there are some large and some small masses is in evidence, and the length of time for the discharge of the entire batch is also observable. Respondents offered no counter explanation for these results and attacked

them solely on the ground that they were not made in the presence of respondents' counsel.

An inspection of this particular exhibit shows that seven major slugs passed through the pipe line in the discharge of this batch of concrete; that a particular slug B passed the gauge 2 on the two-second mark. This same slug passed the gauge 3 on the five-second mark, and impinged upon the mass recorder on the six-second mark, indicating that it required four seconds for this slug to travel the entire length of the discharge pipe. Each of the other major slugs can be traced in this same way and will be found to be traveling at about the same rate of speed.

The fact that the first slug marked A on the chart Plate Four gave no indication on gauge 3 is probably explained by the fact that this slug traveled past the connection with gauge 3 entirely through inertia which the slug had gained in traveling up to or near that position in the discharge pipe. In fact it is probable that the speed of air flow for the first slug is greater than the speed of air flow for subsequent slugs and that for this reason subsequent slugs had somewhat diminished the general air flow in the pipe line by the time the first slug reached the position of gauge No. 3 so that this slug at this position was no longer being impelled by air differential but was at this position being impelled almost wholly by its own inertia set up in the first part of the pipe line. It is also possible that this first slug broke down and lost its piston characteristic prior to its passage past the connection with the No. 3 gauge but that it had a sufficient inertia nevertheless to strike the impact recorder as a mass and thus produce the indication A on the impact recorder tape. This seems to be a reasonable explanation of the fact that all of the other major slugs can be clearly traced on all three gauges.

Respondents' contentions based upon its oscillograph record, Defendants' Exhibit 189, are set forth in Wilkins' testimony (Rec. 445), where respondents' expert Wilkins said, speaking of Defendants' Exhibit 189:

> "The whole film indicates that the flow is practically uniform with a mixture of air which remains the same.
>
> "Q. Do I understand from your testimony then that this oscillograph record, Exhibit 189, represents in the solid line the solid concrete or more solid portion of the concrete?" (Counsel was here referring to the top line to the right of the offset.)
>
> "A. More solid than at the top.
>
> "Q. And that the wavy and broken line represents the upper surface of the flow?
>
> "A. Not the upper surface. It still had concrete in it to carry the current. It had more air and less concrete."

Record 446:

> "Q. What was the result of your findings by these tests?
>
> "A. The general conclusions were that the concrete flowed through the pipe with a proper supply of air practically a uniform mixture of air and concrete, somewhat denser at the bottom."

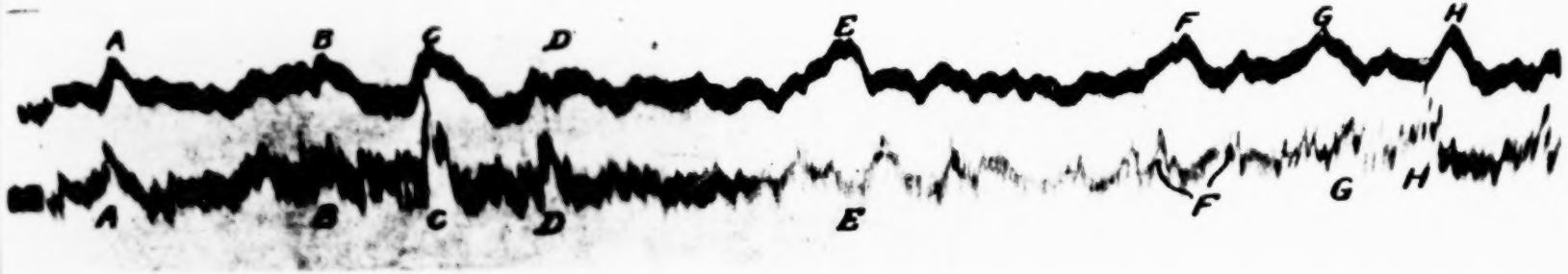
That the line marked A to D on Defendants Exhibit 189 is a base or zero line was testified to by Wilkins (Rec. 444) where he said:

> "When the pipe is completely full the deflection from the zero which is indicated at the start would extend nearly across the film."
>
> "If the concrete went out in plugs or slugs it would give a hump and then drop back to zero and then drop back and give another hump as each went by." (Rec. 443.)

It is to be noted that Defendants' Exhibit 189 although recording twenty and one-half seconds (Rec. 450) in time of the discharge from the concrete machine, does not in fact, record a sufficient length of time for the upper and

lower oscillograph record lines to return to their zero positions. That is, if Defendants' Exhibit 189 is examined clear to the right end of the strip, it will be noted that the broad and narrow record lines are each still offset about one-half inch from their zero or base positions. The reason for this we believe to be quite obvious; the pipe being wet from the passage of concrete, has brought down the resistance between electrodes in the pipe to such a degree that deflection of the light beams of the oscillograph remain offset substantially this one-half inch whether or not any concrete is flowing through. With this understanding the total deflection of the light beams due to the passage of concrete as distinguished from their normal deflection of about one-half inch due to the wetting of the inner surface of the pipe, is relatively small. That is, the lowering of the resistance by the passage of the first concrete, at which time the surface became wet, was sufficient to offset the beam of light substantially one-half inch. Apparently the difference between a mere wet surface and the passage of concrete, made only a sufficient difference in resistance to produce an additional deflection generally small in comparison to the deflection produced by the wet surface alone. Why it is that the record of the changes in resistance between contacts A and D should be less rapid than the changes in resistance between the contacts B and C, petitioners cannot explain but we think that in all probability the difference resulted from differences in the sensitiveness of the oscillograph elements. The least sensitive of the two elements apparently carries a mirror at least twice the size of that carried by the more sensitive element and it is perhaps on account of this increased inertia that the element connected with the contacts A and D, near the top of the pipe, Plate Two, did not record the same rapid variations as

PLATE FIVE



the element connected with contacts B and C near the bottom of the pipe.

At any rate, we think the evidence conclusive that the contacts B-C located at the bottom of the pipe recorded rapid fluctuations in resistance, whereas contacts A-D located near the top of the pipe recorded less rapid variations in resistance.

Respondents' expert Wilkins, in reaching his conclusions based upon the test, wholly ignored the basic deflection of the light beams caused by the wetting of the surface of the pipe and therefore concluded that the condition within the pipe as indicated by the offset of the light beams, was due wholly to the passage of a substantially homogeneous mixture of concrete and air through the pipe. Respondents contend that the major part of this offset is due to the wetting of the inside of the pipe and that the fluctuations from the offset position of about one-half inch due to moisture are due to the passage of slugs of concrete through the pipe.

On Plate Five petitioners illustrate the first seven seconds of the record of Defendants' Exhibit 189 in which the length of the record has been foreshortened by a photographic process from substantially 50 inches down to substantially 8 inches without materially changing the height of the fluctuations. This was done solely to make the fluctuation more plainly noticeable to the eye. It produced exactly the same result as would have been obtained by moving the film more slowly through the oscillograph machine. The points marked A, B, C, D, E, F, G and H on this foreshortened reproduction of part of Defendants' Exhibit 189 are respectively the positions located at A—3¼ inches, B—10 inches, C—13⅜ inches, D—16½ inches, E—27½ inches, F—38 inches, G—42⅝ inches, and H—46⅝ inches from the offset near the left-hand

end of Defendants' Exhibit 189. It is petitioner's contention that during this seven seconds of the discharge of concrete from respondents' machine, seven major slugs of concrete represented by the humps A, B, C, E, F, G and H passed the contacts D and A in the discharge pipe and that one minor slug D also passed these contacts.

By reference to Plaintiff's Exhibit 207 reproduced here as Plate Four, it will be seen that exactly the same number of slugs marked on this Plate Four, A, B, C, D, E, F and G passed through the discharge pipe in petitioners' test in substantially the same length of time as covered by the foreshortened portion of Defendants' Exhibit 189.

In the concrete machine of petitioner's test it is probable that the air pressure was a little higher than in the concrete machine used in respondents' test because it appears that seven slugs of concrete passed the position of gauge 2 of petitioner's test in a total lapsed time of five seconds whereas in respondents' test it required substantially six seconds for the passage of seven slugs of concrete.

Some Common Sense Observations on the "Slug Theory."

Respondents' expert Wilkins testified (Rec. 449) that the speed of travel of the concrete mixture through the discharge pipe was "between 15 and 20 feet a second." Supposing this to have been 17½ feet per second, the speed would have been 1,050 feet per minute or substantially 12 miles per hour.

Respondents' theory is that there is a substantially continuous mixture of air and concrete traveling through this pipe at 12 miles per hour, not in piston form, but kinetically like leaves in a wind.

Is it at all reasonable that a twelve-mile wind could

pick up and carry with it kinetically one-fourth its volume of concrete? Winds traveling twelve miles per hour are encountered almost every day and it is inconceivable that this kind of a breeze could carry with it about one-fourth or one-fifth its volume of concrete.

Petitioner's test, as shown by the chart, Plate Four, demonstrates that respondents' expert Wilkins was about right as to the speed of travel of the concrete through the pipe, that is, the slug B, Plate Four, traveled the 50 feet from gauge 2 to gauge 3 in three seconds, indicating a speed of only slightly less than 20 feet per second through the pipe line. This same slug, however, traveled the last 4 or 5 feet from gauge 3 to the impact recorder in one second and was therefore discharged from the end of the pipe at a very much increased velocity, probably more than one mile per minute. The slug being discharged from the end of the pipe naturally accelerates very rapidly as it approaches the end of the pipe because the differential of pressure on the two sides of the slug being discharged increases rapidly as the slug approaches the end where it is opposed only by atmospheric pressure.

What petitioner contends may be visualized as a number of pistons substantially equally spaced apart in a tube, and discharged from the tube by the application of pressure at one end. Although the average speed of travel of the pistons through the tube may be comparatively small, the discharge speed of each piston as it leaves the end of the tube will be high.

This Honorable Court may give little or no importance to the accuracy of petitioner's "slug theory." It is the theory upon which petitioner believes these concrete machines operate. The important thing is not that petitioner's and respondents' commercial machines operate upon the "slug theory" but that they operate alike. It

has been the aim, therefore, in this appendix to petitioner's brief, to show that petitioner's and respondents' devices perform with the same characteristics, and that to say the least, the "slug theory" is not an untenable explanation of the unexpected but like results obtained from these two differently appearing but identically functioning structures.

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IN THE

SUPREME COURT OF THE UNITED STATES

No. [redacted] 4

CONCRETE MIXING & CONVEYING COMPANY (a Corporation),
Plaintiff-Petitioner,

vs.

R. C. STORRIE & COMPANY (a Partnership),
Defendants-Respondents.

REPLY BRIEF FOR PLAINTIFF-PETITIONER.

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IN THE

SUPREME COURT OF THE UNITED STATES

No. 528.

CONCRETE MIXING & CONVEYING COMPANY (a Corporation),
Plaintiff-Petitioner,

vs.

R. C. STORRIE & COMPANY (a Partnership),
Defendants-Respondents.

REPLY BRIEF FOR PLAINTIFF-PETITIONER.

Respondents' Erroneous Statement of What Is Covered by McMichael's Claims.

Respondents' counsel, at page 25 of his brief, appears to be laboring under a misapprehension of what is covered by the McMichael claims. In referring to the McMichael claims in suit, he says:

> "Stripped of meaningless words the broadest of these claims cover the **bare thought** of filling a hopper with concrete, making the hopper air tight, **and introducing air under compression** into the hopper to force the concrete out through a discharge pipe to the desired place of use." (Bold-face ours.)

Thus respondents' counsel would have it appear that McMichael's claims cover only the **bare thought** of introducing air into an air-tight hopper or container containing concrete, and that the claims in suit are silent as to the vital and indispensable feature of the McMichael apparatus, viz., the high velocity nozzle, located just where the concrete is compacted in passing from the tapering portion of the container into the discharge conduit.

Why does counsel for respondents prefer to ignore the velocity nozzle? Because it is a novel and essential element of McMichael's claims. Without the velocity nozzle it is impossible to get the combination which is essential to practical operativeness, viz., pressure behind the mass *plus* a high pressure jet of air at the point where the concrete is compacted in passing from the container into the conduit.

Mr. Townsend knows that his clients' machine would be useless for placing concrete if its velocity nozzle were eliminated. He cannot find any such nozzle in the prior art. He knows it was new with McMichael. Therefore, he does not care to talk about it.

The Claims in Suit Do Feature the Velocity Nozzle.

The claims in suit are Nos. 1, 2, 17, 18, 24, 29, 34 and 35.

CLAIM 1.

There is no question about the fact that this claim calls for the velocity nozzle, in the critical and necessary position. The claim, after calling for "two compressed air inlet pipes connected to the chamber," says "one of them terminating in a **nozzle inside** of the chamber **directed toward the opening** into the said conduit and the other pipe opening into the chamber at a point remote from said **nozzle.**"

CLAIM 2.

Claim 2 calls for the velocity nozzle in the following language "and **another** compressed air inlet pipe leading through the chamber wall and terminating **within the chamber near the opening** into the conduit in a nozzle directed toward said opening."

CLAIMS 17 AND 18.

After calling for the other essential elements, including the means for placing air pressure behind the mass of concrete in the chamber, each of these claims calls for the velocity nozzle in the following language: **"and means for causing a jet of air to impinge upon successive portions of the mass in the general direction of the discharge duct to directly assist their movement therethrough."**

CLAIM 24.

This claim, after reciting the chamber and its relation to the discharge conduit, calls for the velocity nozzle in the following language: **"and means for directing a pressure agent into the discharge duct in the general direction thereof to engage sub-masses of the materials and aid their movement through the duct to the discharge point."**

CLAIM 29.

This claim calls for the velocity nozzle in the following language: "and a **means** for supplying a jet of fluid pressure agent in the general direction of the duct **at a point adjacent its point of connection with the chamber** to engage sub-masses of materials to assist their movement through the duct."

CLAIM 34.

This claim, after calling for other essential elements of McMichael's combination, including "manually controllable means for supplying a fluid pressure agent to the chamber back of a mass of materials contained therein," calls for the velocity nozzle in the following language: **"and manually controllable means for directing a fluid pressure agent into the discharge duct in the general direction thereof."**

CLAIM 35.

This claim calls for the velocity nozzle in the following language: **"and means manually controllable independently of the aforesaid means for directing a fluid pressure agent into the discharge duct in the general direction thereof."**

Thus it appears that the velocity nozzle, an absolutely essential feature of the McMichael apparatus, is as a matter of fact recited and stressed in all of the claims. Respondents' statement of what is covered by the claims in suit is shown to be erroneous.

INFRINGEMENT.

The Holdings of the Ninth Circuit Court of Appeals, and Judge Bourquin, on the Question of Infringement Are Inconclusive, for the Following Reasons:

1. Infringement *per se* is not a question of fact. It is a question of law, depending upon the interpretation of the patent and its claims. The lower courts in this case erred in failing to follow the courts of the Second Circuit on a question of law, *i. e.*, the scope to be accorded the McMichael patent when interpreted as a legal document.

2. The essential facts concerning the construction and operation of respondents' apparatus are obvious from an examination of the apparatus itself. There can be no dispute here as to the essential features of that apparatus and there was no such dispute in the lower courts.

3. Taking the wholly undisputed facts as found by the lower courts, and admitted by the respondents, there is a clear case of infringement when the McMichael patent is given its proper legal construction.

4. In considering the question of infringement, the courts in the Ninth Circuit did not pass upon the McMichael patent as a legal document. To the contrary, they held non-infringement because of certain unimportant differences between the illustrative embodiment of the invention shown in the McMichael patent and the structure and movement of material in respondents' apparatus;—variations which are clearly and properly covered by the patent.

> "The question of infringement or no infringement is one of law, and susceptible of determination on this writ of error."
>
> *Singer Mfg. Co.* v. *Herman Cramer,* 192 U. S. 265, 275; 48 L. Ed. 437, 444; 24 Sup. Ct. 291.

> "When the question of infringement depends entirely upon the construction of a patent, either upon its face or in connection with facts of such a nature and effect as not to be reasonably disputed, the question is one of law for the court."
>
> *Western* v. *Robertson,* 142 Fed. 471; 73 C. C. A. 587.

The case of *Stilz* v. *United States,* 269 U. S. 155; 70 L. Ed. 202 (cited by respondents), is not in point for the reason that in that case the holding of non-infringement by the lower court was based *on a finding of fact* as to the construction and operation of oil burners used by the United States. The Court of Claims found that

> "It does not appear that any of the devices of the plaintiffs' said Letters Patent . . . *have been manufactured or used by the United States,* or that said Letters Patent have been infringed by the United States."

Infringement may sometimes depend solely on the question *as to what the defendant has actually done,* as in the Stilz case, and in such a case it is a question of fact. In the present case it is not even a *mixed* question of fact and law; it is substantially a pure question of law, that is to say one involving the interpretation of the patent as a legal document.

Respondents' counsel, at pages 5-8 of his brief, would have it appear that there is a disputed question of fact concerning the machine which Oxenham saw in operation on October 10, 1923, *i. e.,* a dispute as to whether this machine had its compressed air inlet at the back of the chamber *above* or *below* the top of the concrete mass. There is no such dispute.

Respondents' counsel believes, or pretends to believe, that we maintain that air was admitted through the *capped* pipe at the upper part of the rear wall of this machine. We make no such contention. We agree with

respondents' counsel that in both of respondents' machines (*i. e.*, the one which Oxenham saw and the later form of the Hackley patent) the air admitted at the back of the machine was introduced below[1] the top of the mass of concrete, that is to say exactly as shown and indicated opposite page 229 of our main brief.

Nor do the beliefs of the Ninth Circuit Court of Appeals, and Judge Bourquin, concerning the manner in which the concrete is forced through the conveying conduit, lend any conclusiveness to their holdings on the question of infringement. As the Second Circuit Court of Appeals said in the Powers-Kennedy case:

> ". . . the dispute seems irrelevant"
>
> 27 Fed. (2d) 670; and
>
> "The patent shows nothing which commits the patentee to the slug method of operation." (*Id.*)

The actual construction of one of the respondents' devices is set forth in the Hackley patent and application, and it is admitted by respondents that

> ". . . the Hackley patent as issued correctly describes the Hackley machine." (Respondents' brief, p. 8.)

Furthermore the respondents' machine in this case is substantially identical—but closer to the illustrative form shown in the McMichael patent—with the device which the Second Circuit Court of Appeals held to infringe in the Ulen case. A comparison of the two (our main brief, p. 76) will conclusively demonstrate this. One of the respondents' devices there illustrated is shown as it ap-

---

1 As a matter of fact, the air inlet at the *bottom* of the chamber behind the mass is even more *fully* and *clearly* the compressed air inlet "behind the mass," within the language of McMichael's claims, than would be such an inlet located substantially above the bottom. Being on the bottom it is behind the *entire mass*, and must force the entire mass to the restricted outlet where it is compacted and then acted on by the velocity nozzle.

pears in the Hackley patent and therefore is *conceded to be correct.*

In *Continental Paper Bag Co.* v. *Eastern Paper Bag Co.*, 210 U. S. 405; 52 L. Ed. 1122, 28 Sup. Ct. 748, this court considered the question of infringement anew to the extent of deciding the scope of the claims and whether or not the lower courts were warranted in invoking the doctrine of equivalents and thus holding the defendant's device an infringement, saying:

> "The lower courts, therefore, found that the invention was a broad one, and that the machine used by the Continental Company was an infringement. And these were questions of fact upon which, both of the courts concurring, their findings will not be disturbed unless clearly wrong." (210 U. S. 416.)

In the present case the Courts of Appeals for the Second and Ninth Circuits did not concur, but differed radically in applying the patent to two substantially identical machines. This conflict, therefore, must be decided by this court. It is essentially a question of law as to the proper interpretation of the patent.

That the Courts in the Ninth Circuit Did Not Decide the Scope of the McMichael Patent As a Question of Law Nor Compare It With Respondents' Devices in Deciding This Case Is Apparent From Their Decisions.

The District Court noted that in respondents' apparatus the air pipes are

> ". . . pointing toward the discharge pipe, one opening into the entrance of the latter, one opening into the opposite end of the container." (R., p. 614.)

Thus finding air pressure behind the mass and at the outlet, as specified in McMichael's claims, the District Judge

refers to "plaintiffs' contentions," but not to the language of the specification or claims of the McMichael patent, and interprets these "contentions" to mean

> "that McMichael invented (1) the hopper bottomed container, (2) application of compressed air to convey concrete, and (3) the method of the lower air to detach portions of the concrete, which alternating with like slugs of air, are driven through the discharge pipe." (R., p. 615.)

He thus reads into all of the claims of the patent not only the hopper bottomed container, which is not referred to in any of the claims, except very broadly in claims 34 and 35, but also reads into all of the claims "slug action" which is not referred to in any of them, unless it be by the words "successive portions" in claims 17 and 18 and "sub-masses" in claims 24 and 29. He then turns to the prior art and states that "hopper bottoms" and "compressed air to convey mobile substances" were known.

The District Judge thus failed to consider the velocity nozzle at the entrance to the discharge pipe, and the combination of such a velocity nozzle with compressed air behind the mass, all of which is fully embodied in respondents' apparatus and entirely lacking in the prior art.

The conclusion of the District Judge on the question of infringement is

> ". . . that Hackley's apparatus is a different combination than McMichael's, has no *upright cylindrical hopper* bottomed container, is without the *U-bend*, employs no upper air save some incidental back pressure, does not discharge *slug fashion as claimed is the invention of McMichael*, and so, does not infringe." (R., p. 621.)

Thus—without referring to specification or claims—the District Judge reads *three limitations, i. e.*, "upright

cylindrical hopper," "U-bend," and "slug fashion" into the claims, notwithstanding that the claims themselves contain no such limitations, and ignores the vital and essential thing in the claims, viz., *the jet at the outlet combined with pressure behind the mass.*

The District Court therefore made a clear error of law in interpreting the patent, and because of this error held that respondents' apparatus does not infringe.

The District Judge found all of the elements of McMichael's claims in respondents' apparatus, failed to find such elements in the prior art, but held non-infringement by erroneously reading into the claims unessential elements not included therein and *expressly excluded therefrom.*

The "incidental back pressure" is no less back pressure, or *pressure behind the mass* than that of the McMichael patent and that of the devices held to infringe in the Ulen and Powers-Kennedy cases. It makes no difference, of course, how this pressure is produced or whether or not it is incidental to some other function. *It is absolutely essential,* and respondents do not question this fact. Furthermore, it is *inevitable* from the very nature of the apparatus and its use. When compressed air is injected into the vessel *at any point* it instantly establishes pressure behind the mass. Without that pressure the apparatus would not operate to move the material. Judge A. N. Hand (in the Powers-Kennedy case) said:

> "If this were not so, the high pressure through the discharge pipe would hold back the concrete." (Exhibit Book, p. 31.)

This pressure behind the mass is injected directly behind the mass (see pipe 17, Hackley patent, Exhibit Book, p. 78, and the same pipe numbered 4 appearing on the drawing opposite page 3 of respondents' brief).

The fact that it may also assist in pushing the mass of concrete along the bottom of the vessel simply shows that it serves a double purpose.

In the Ulen apparatus a plunger was used to do the pushing (p. 181, Ulen R.) and the pressure behind the mass was admitted in front of this plunger. In the Hackley apparatus one or more air inlets behind the mass are employed, but the operation is essentially the same, and in each case *pressure behind the mass* is present and essential.

The Ninth Circuit Court of Appeals Made the Same Error of Law in Considering the Question of Infringement.

The opinion of the Ninth Circuit Court of Appeals *neither quotes from nor refers to the language of the claims* which are the vital things in the patent. But the Court of Appeals treats the "slug theory," with which the claims are not concerned, as essential. Thus after devoting a large part of its opinion to the discussion of the slug theory the Court of Appeals said:

> "We think that the slug theory, when all is said, has no bearing upon the merits of the present controversy, for, whether or not the *appellant's* apparatus operated to deliver concrete in slugs or sections, it is very clear that the *Hackley apparatus* operates in delivering a constant stream of concrete, interrupted only so far as it is interfered with by the air which accompanies it through the discharge pipe." (27 Fed. (2d) 841.)

The Ninth Circuit Court of Appeals, therefore, read into the patent an unessential element, "slug action," which is not even referred to in most of the claims and is only indirectly suggested in others.

Here is a direct conflict between the Second Circuit Court of Appeals and the Ninth Circuit Court of Appeals

in the interpretation of the patent, the Second Circuit saying that the controversy over slug action is "*irrelevant*" since the patent *is not committed to any such thing* (27 Fed. (2d) 670), and the Ninth Circuit finding that the patent *is so committed* in order to find non-infringement. That the Ninth Circuit Court of Appeals is in error is manifest, on the fundamental principle in patent interpretation that an element cannot be read into a claim to avoid either anticipation or infringement.

The reference to "sub-masses" and "successive portions" in four of the eight claims here involved, *does not necessarily mean slug action.* It is stated that the jet engages successive portions or sub-masses. Obviously, it does, as these successive portions are forced into the outlet by the pressure behind the mass. Whether it separates them into slugs or piston-like sub-masses and thus propels them through the conveying conduit is not material, even in these four claims.

And the Ninth Circuit Court of Appeals finds that the Smith 1872 patent "contained all the features of the appellant's patent *except the nozzle for the admission of air near the point of exit,*" and that one of the pipes of the Duckham 1875 British patent was "**locatable** at the exit" —though not even suggested as being located thereat.

In *Permutit Co.* v. *Harvey Laundry Co.*, 279 Fed. 713, 718 (C. C. A., 2), the court said:

> "an invention, patented here, will not be defeated by a prior foreign patent, unless its descriptions and drawings contain or exhibit a substantial representation of the patented invention in full, clear and exact terms, so as to enable a person skilled in the art or science to which it appertains, without the necessity of making experiments to practice the invention. *Seymour* v. *Osborne*, 11 Wall. 516, 20 L. Ed. 33; *Gen. El. Co.* v. *Hoskins*, 225 Fed. 464, 140 C. C. A. 150."

Thus, in order to find non-infringement, the Ninth Circuit Court of Appeals reads out of the McMichael patent the most vital and important feature of *all* the claims, viz., the location of the jet at the outlet where it definitely will co-operate with the pressure behind the mass to perform the peculiar function essential to operativeness.

The Ninth Circuit Court of Appeals also refers to "air pressure *above* the contents of the tank" as essential to the patented invention, whereas pressure "*back of*" or "behind" the mass—whether above, below or on a level with it—is the essential thing of some of the claims and is not specifically mentioned at all in some of them. Claims 1 and 2 merely call for compressed air inlets "inside" the chamber or "remote from the conduit"—precisely as in respondents' apparatus—claims 17, 18, 34 and 35 say "back of" the mass, and claims 24 and 29 call for the "pressure agent" or "jet" *at "the discharge duct" only.*

The Ninth Circuit Court of Appeals, therefore, read into the patent this narrow, unimportant feature, expressly avoided in the claims, in order to remove the respondents' apparatus from the clear scope and meaning of the claims.

The Colored Drawing at Page Three of Respondents' Brief Is a Purely Imaginary and Fanciful Thing, and Evidently Intended to Beguile the Court.

No such action as that indicated takes place. With a total pressure of many tons on and behind the mass it must inevitably be forced into the small outlet where it is packed and would be jammed were it not for the jet or nozzle at the outlet which drives it through. Nevertheless, *even if the apparatus operated as respondents claim* it would embody the patented invention, since there

is, and must be, at all times, a pressure behind the mass to force it into the outlet and a nozzle at the outlet to force it through and along the conduit.

The Evidence in the Second Circuit Records and That in the Record of This Case Is the Same in Substance.

Judge Bourquin, the trial court in this cause, referring to the Ulen case, says:

> "The record of that case . . . differs from this at bar." (R., p. 610.)

He does not, however, point out any difference in substance either on the question of infringement or the question of invention.

The Ninth Circuit Court of Appeals likewise says of the Ulen case and the Powers-Kennedy case:

> "The decisions . . . relied upon by the appellant, were based on records widely different from that in the case at bar." (R., p. 678.)

But the opinion of the Ninth Circuit Court of Appeals does not point out any substantial differences.

The differences between the records in the Second Circuit cases and the record in this case are merely apparent. They are not real or substantial. Thus:

(*a*) The infringing apparatus in the Ulen case was a horizontal apparatus similar to that of the respondents in this case, but less like the illustrative embodiment of the patent than is respondents' apparatus.

(*b*) The prior art set up by the defendants in the several cases was the same in substance. The device of the Kolsche German patent is like numerous kinetic or flotation patents in the Ulen and Powers-Kennedy records and was actually pleaded in the

latter. Duckham is like the Trewent British patent No. 12,758 (Ulen R., p. 381), but farther removed from the McMichael patent. Both Duckham and Trewent show the conveyance of solid materials in a column of *water*.

(*c*) The Smith patent is in the Powers-Kennedy record and was considered by Judge A. N. Hand and the Second Circuit Court of Appeals.

The Larkin deposition not only fails to show any new or anticipatory matter, but actually proves the value and importance of McMichael's advance in the art.

Larkin admits (R., p. 513) that his experiments were abandoned because his apparatus *being without the outlet jet* "did not result in the production of a practically useful device or method" (R., pp. 509-10), and that McMichael's patent in suit solved the problem.

The Leake deposition and application add no new material of any kind.

Judge Bourquin and the Ninth Circuit Court of Appeals should have rejected the Leake deposition and patent application as worthless and this court should do so for the following reasons:

1. Leake's alleged experiment of 1905, even if it occurred as claimed by respondents, admittedly was entirely without the indispensable velocity nozzle. Therefore, it was an abandoned failure. It cannot anticipate McMichael's essential combination—pressure behind the mass *plus* the velocity nozzle acting on the concrete where compacted at the outlet.

2. The trial court never saw Leake, and, therefore, had no opportunity to judge his character, credibility or mental faculty. Your Honors are just as well able to judge the weight of the Leake deposition as was the District Court. Therefore the holdings of the courts below,

based on the Leake deposition, do not come under the Supreme Court decision in *Adams* v. *Gilliland*, 242 U. S. 350, which we have cited at page 124 of our brief in the Powers-Kennedy case.

3. The assignment by Leake to McMichael's attorney Bliss was dated December 2, 1910 (Exhibit Book, p. 479), whereas the decision giving McMichael priority over Leake was rendered before February 25, 1910 (*Id.*, p. 409), and the interference claims were relinquished and cancelled by Leake February 28, 1910 (*Id.*, p. 410), all more than nine months *before* any one connected with the plaintiff, or McMichael, acquired any interest in the Leake application.

4. Leake's alleged prior use about September 1, 1905 (R., p. 583), is completely answered by his oath in his application (Exhibit Book, p. 335), in which he swears that his invention was not in public use more than two years prior to September 21, 1907.

5. Leake's deposition is absolutely uncorroborated and unsupported by any other witness or by any contemporaneous writing, drawing, photograph or other tangible evidence whatsoever.

The Tests of the Smith 1872 Patent Prove Nothing But the Disingenuous Character of the Defense.

The statement of the Ninth Circuit Court of Appeals that the Smith 1872 patent contained "all the features of the appellant's patent *except the nozzle* for admission of air near the point of exit" (27 Fed. (2) 839) indicated a failure to appreciate the vital importance of the velocity nozzle. It also indicates the failure of the Court of Appeals to appreciate the importance of combined pressure *behind* the mass and at the *front* of the mass. The tests of the Smith apparatus, regarded as so important by the

Ninth Circuit Court of Appeals, were of no value because:

(*a*) The Smith apparatus has no velocity nozzle and therefore even if it were made to work after a fashion it obviously did not and could not work like the McMichael apparatus and respondents' apparatus which depend for their operativeness upon pressure behind the mass *combined with* nozzle action at the exit of the container.

(*b*) The material was forced only a short distance; it was a liquid mixture (which will not make concrete) and only a very small aggregate was used (R., pp. 447-9 and 465).

(*c*) The tests were made by witnesses employed by an infringer (*Id.*, 469-71). The witnesses merely say that they were "satisfied" with the test, but infringers are easily satisfied with the operation of a prior art device, even though they prefer to use and do use the patented device.

(*d*) The Smith patent calls for a mixture which has three-fifths the bulk of solid materials added to it in water. This makes the mixture three-eighths water or 37½%. This is three times the normal amount of water, which is usually about 12% (one gallon to one cubic foot) according to common knowledge and all of the authorities, including Department of Agriculture, Good Roads Section. 300% of the normal amount of water will make nothing but a thin soup of the sand and cement, will entirely separate this soup from the mass of stone, and will destroy the concrete mixture.

(*e*) But respondents' witnesses, in order to make a seemingly plausible test went far beyond the Smith patent and used a tank "two-thirds full of water" (Hackley, R., p. 439). This made the mixture, even

if the tank were entirely filled, *66% water.* This is not only an absurdity, but a fraud, and the statements of the witnesses that this was a concrete test or a test with the Smith mixture (Peterson, R., p. 465), are palpably deceptive.

Incidentally this testimony discredits respondents' entire testimony, on the face of the record (*falsus in uno, falsus in omnibus*). This applies to all three of respondents' witnesses, Hackley, Wilkins (R., p. 447), their expert, and Peterson.

The foregoing demonstrates three things, to-wit:

1. That the respondents in an attempt to anticipate the McMichael patent were obliged to depend upon an old paper patent granted in 1872 and never heard of in the practical art.

2. That to support the utterly inadequate showing of the patent they felt obliged to resort to tests using a mixture having an absurd proportion of water.

3. That the entire defense was of such a character that the trial court should have thrown it out.

The Court of Appeals in its opinion says that the testimony regarding the alleged tests of the Smith apparatus is "undisputed." *It is not necessary to dispute testimony which if true would be worthless, and which is palpably false.*

The Trewent British patent in the Ulen record which proposed to float ashes in a column of water by using compressed air jets, is no more relevant than the Smith patent, and vice versa.

The Kolsche German Patent of 1880 Has No Velocity Nozzle.

On page 98 of his brief respondents' counsel contends that the old Kolsche German patent (Exhibit Book, p. 183) has the velocity nozzle which is such a vital and indispensable feature of the McMichael invention and of petitioner's and respondents' machines.

The Kolsche patent clearly does not have a velocity nozzle, for a "velocity nozzle," within the lexicon of McMichael's patent, is one which discharges a high pressure "jet" of air *at the place where the concrete is crowded and packed* into the tapering exit of the container under the pressure of the air behind the mass.

The large diameter tube *a* of Kolsche is nothing but an extension of the conduit proper. It leads to a *blower or fan* which sets up a *current* of air which carries along *in suspension* small particles of sandy or granular material which trickle into this air current,—a kinetic conveyor pure and simple. A *blower or fan* is a device for delivering large quantities of air at little or no pressure. The low pressure air current set up by the blower or fan of Kolsche, and delivered through the large diameter tube or nozzle *a*, performs no function like that of the "velocity nozzle" of McMichael, which discharges a "jet" of high pressure air against *compacted materials* at the outlet of the container.

For Discussion of McMichael's Supplemental Oath and Answer to Respondents' Criticism of His Application See Our Brief in Powers-Kennedy Case (No. 501) Pages 36-47.

The supplemental oath actually recited claims 1, 2, 4 and 6 of the patent as issued, with only slight, immaterial changes in claims 1 and 2, and recited other claims as broad as any others here in suit.

Epithets.

Respondents' brief teems with opprobrious adjectives applied to petitioner's counsel and brief. The words: "misleading exhibit" (p. 5), "trick drawing" (p. 5), "imposition on this court" (p. 7) "bogus drawing" (p. 8), "sinister motive" (p. 8), "hoodwinked the New York Court" (p. 60), "misleading and deceptive charts" (p. 72), "distorting charts" (p. 72) "falsifying records" (p. 72), "misrepresenting testimony" (p. 72) "spurious drawing" (p. 82), "attempted imposition on this Court" (p. 82) "bogus drawing" (p. 82) flow trippingly from the pen of respondents' counsel.

Some counselors seem to find it easy to interlard their discussion of their opponent's arguments with such devastating adjectives. We suspect, however, that courts learn to discount such language when too freely used.

We shall not attempt to exercise ourselves over every opprobrious epithet which respondents' counsel has applied to us and our brief.

We shall content ourselves by referring to the facts which have sufficed to inspire the use of a few only of these terms by respondents' counsel.

The "Trick Drawing."

(Respondents' Brief, pp. 6-8.)

By the language last quoted, respondents' counsel assails the drawing Exhibit 13 (Exhibit Book, p. 84) which illustrates the machine which Oxenham saw (Rec., p. 78) in operation in the Skagit River tunnel on October 10, 1923, and of which, in his presence, were taken the photographs appearing on pages 85 and 86 of the Exhibit Book.

The first criticism of the drawing seems to be that it shows an upper air pipe 29, whereas respondents claim that this pipe was never used in practice. The photographs (Exhibit Book, pp. 85 and 86) distinctly show that this pipe was present when Oxenham's photographs were taken. Note the pipe 29 in the upper photograph on Exhibit Book, page 86. Petitioner has never contended that this pipe was being used when Oxenham saw the machine. As a matter of fact, its inner end was capped (closed) when Oxenham saw it (Rec., p. 80) and *is so shown in the drawing.* There should be no quibbling about this matter. The drawing simply shows the pipe 29 exactly as Oxenham saw it and as recorded by the photographs taken at the time. Hackley, on Record, page 86, says that one of his machines did have the unused pipe 29.

If pipe 29 had been left out of the drawing, and had thus failed to correspond with the photographs, petitioner would doubtless have been charged with a "sinister motive" in the omission. Having shown the machine exactly as it was, we are charged with offering a "bogus drawing" because the pipe, though present, was not used.

We think it should be obvious why the pipe 29 was

first provided and subsequently capped. Knowing that pressure above the concrete was essential, Mr. Hackley provided the pipe 29 to be sure that such pressure was obtained. As soon as he found that sufficient pressure above the concrete was created by the air admitted through the pipes 28-A, 27-A, 26-A and 25-A, he simply closed off the pipe 29 as being unnecessary. To have retained it would have required another valve for the operator to manipulate.

The second criticism of the drawing appears to be that on the trial the illustration of pipe 27-A was changed (by the witness Brock, Rec., p. 131) to show it discharging horizontally instead of vertically. When Oxenham and McCaleb saw the machine, this pipe did discharge vertically. In subsequent Hackley machines used on the Skagit River job (and Hackley says there were several—Rec., p. 75) this pipe discharged horizontally, as remembered by Hackley and Brock. Therefore, the drawing was changed by Brock in the hope of avoiding controversy about an unimportant detail. The Hackley machine embodies the McMichael invention, regardless whether this air pipe 27-A discharges vertically or horizontally. Moreover, the Hackley machine would be a McMichael machine even if this air pipe 27-A were entirely eliminated. It is merely one of several pipes, remote from the velocity nozzle 25-A, which is responsible for the pressure which is maintained above and behind the concrete in the machine chamber.

No useful purpose can be accomplished by quarrelling about slight differences between the early machine which Oxenham saw and photographed and the later machine shown in the drawing of the Hackley patent. *It is admitted by respondent that the Hackley patent correctly illustrates and describes the Hackley machine* (Respondents' Brief, p. 8). Both forms of the Hackley machine

embody the same essential elements and operate in the same way to accomplish the same result. With this Hackley agrees. He testified:

> "Q. Do you attribute any difference in mode of operation to those slight differences which you allude to?
>
> "A. No, no difference." (Rec., p. 76.)

Even respondents' counsel does not attempt to point out any functional difference between the early machine as shown in the drawing Exhibit 13 and the later machine as disclosed in the Hackley patent. There is none.

Mr. Townsend wastes paper in assailing Exhibit 13 as "deceptive" and "trick" and "bogus" only because he wishes to raise a smoke screen to confuse the real issues of this case.

Petitioner's Impact Device With Gauges Not Impractical.

(In reply to Respondents' Brief, p. 71.)

Respondents' contention that the gauge pipes would clog and that the gauges would act too slowly, are most emphatically answered by the fact that the gauges did work satisfactorily. The only possible theory upon which Mr. Hackley's opinions quoted on page 72 of Respondents' Brief could be correct, is that Mr. Ray perjured himself in testifying about his tests and faked the gauge charts which he produced.

The reason that the pipes to the gauges did not clog undoubtedly was because the periods of highest pressure *followed* the slugs, wherefore there was little tendency to blow concrete into the gauge pipes. If the entrance to any gauge pipe had become clogged, the expansion of the air in the gauge pipe at the time of the next decrease in pressure in the conduit would have cleared out the obstruction.

A gauge does not have to be very fast to record one or two slugs per second, this being the number indicated by both petitioner's and respondents' tests.

Petitioner's "Misleading and Deceptive Charts."
(Respondents' Brief, Page 72.)

Why respondents' counsel should feel called upon to accuse petitioner's counsel of "falsifying records and misrepresenting testimony" is inconceivable.

The only difference between petitioner's oscillograph chart and respondents' oscillograph chart resides in the non-crossing of the light beams in petitioner's and the crossing of the light beams in respondents'. Petitioner has shown ample grounds for its contention that the light beams did not cross as respondents contend.

Mere differences of opinion or different conclusions based upon fundamental facts do not warrant a charge of fraud. On page 78 of Respondents' Brief, counsel attempts to explain the fact that the upper line of the oscillograph record, Exhibit 189, is broader than the lower line because the light beam creating the lower line was in more rapid motion than that creating the upper line. The insufficiency of this explanation is apparent from the fact that there are many places along the curves where for a period of short duration there was no motion in either the upper curve or the lower curve. Wilkins' error in properly identifying the oscillograph curves with the electrodes is apparent at any of these stationary positions, even if respondents' counsel were right in his statement that a rapidly moving light beam traces a narrower line. See, for example, the position about half way between the five and six-second marks and again the position just following the six-second mark where no substantial movement is shown in the light beam tracing

the lower curve, and at which positions the widths of the lower and upper curves can be readily compared.

In his desperation, respondents' counsel attempts to explain (page 79) the greater width for the upper oscillograph curve by the fact that the light beam is deflected perpendicularly to the film.

In the design of an oscillograph machine, the distance from the mirror to the film is so great (about 16 inches) that a deflection of one inch across the film would make no noticeable difference in the width of the line traced. Mathematically, a spot which is 0.0625 of an inch in width, if projected perpendicularly from a distance sixteen inches away from the film, will be 0.06262 of an inch in width if projected to a position one inch away from the perpendicular.

On page 80 of Respondents' Brief occurs an attempted explanation of the fact that the lower oscillograph curve drops below the line A-D which respondents contend to be the base line for that curve. This contention is paramount to saying that a greater amount of moisture clings to the surface of the rubber pipe, providing a current path between the upper electrodes, when the apparatus is not in operation, than is present when the concrete is being discharged. This might be conceivable with respect to the lower electrodes, but it is hardly conceivable that a greater amount of moisture would remain across the top of the rubber pipe between concrete discharges than is present all of the time during a discharge. Our contention is that the greater degree of wetness in the rubber pipe during operation is responsible for the major part of the deflection of the light beams and that the concrete only changed this slightly as the slugs passed.

Petitioner's "Spurious Drawing."
(Respondents' Brief, p. 81.)

Respondent says, "Anyone knows that to foreshorten even a straight piece of string is to cause it to fold and no longer become straight." The fact that a string may crinkle when its ends are brought closer together is beside the point. A perfectly straight line foreshortened photographically will still be a perfectly straight line. The photograph of Defendants' Exhibit 189 appearing at the bottom of the plate opposite page 82 of Respondents' Brief is a foreshortened photograph in that it is reproduced on a smaller scale than the original. By the method of reproduction, this photograph was narrowed proportionately to its foreshortening. In the production of petitioner's Plate 5, the Exhibit 189 was photographically reduced in length without materially altering the original height of the deflections. As explained in our main brief, petitioner has reproduced photographically as nearly as possible, the results which would have been obtained by moving the film through the oscillograph machine at a rate very much less than the rate at which it was actually moved. Petitioner has made this reproduction merely because believing that it brings the facts disclosed by Defendants' Exhibit 189 into a form much more readily analyzed.

Conclusion.

1. The velocity nozzle acting upon the concrete where it is compacted at the exit of the container is of the very essence of the McMichael invention and is recited and stressed in each of the claims in suit.

2. The Ninth Circuit Court of Appeals erred on the

question of validity because failing to appreciate the vital importance of the velocity nozzle and its action upon the concrete where compacted in the outlet under the pressure behind the mass.

3. The Ninth Circuit Court of Appeals failed to appreciate the compelling significance of the fact that respondents, like the infringers in the Second Circuit cases, insist upon using the velocity nozzle located precisely where taught by McMichael.

4. Neither the Duckham British patents of 1875 and 1885, nor the Smith patent of 1872, nor the Kolsche German patent of 1881, nor the unsuccessful experiments of Larkin and Leake, *nor any of the other devices to which respondents give their praise,* had the velocity nozzle or anything resembling it in either location or function.

5. McMichael, *to whom respondents pay the tribute of imitation,* was the first to combine with pressure behind the mass a velocity nozzle acting upon the concrete where compacted at the exit of the container.

6. The respondents' (Hackley) apparatus here involved is substantially identical with the device of the McMichael patent and the devices held to infringe in the Ulen and Powers-Kennedy cases.

7. The Second Circuit Courts properly understood the McMichael invention and properly interpreted and construed the patent in suit.

8. The Ninth Circuit Court of Appeals did not properly understand the McMichael patent and erred, as a matter of law, in giving it a construction more limited than its claims,—much more limited than the scope accorded to it by the Second Circuit Court of Appeals.

9. The decision of the Second Circuit Court of Appeals in the Powers-Kennedy case was right and should be affirmed.

10. The decision of the Ninth Circuit Court of Appeals in this case was in error and should be reversed.

Respectfully submitted,

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OCT 29 1930

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OCTOBER TERM, 1930.

No. 4.

CONCRETE MIXING & CONVEYING COMPANY (a corporation), *Petitioner,*

vs.

R. C. STORRIE & COMPANY (a partnership), *Respondent.*

PETITIONER'S REPLY TO "DEFENDANT'S-RESPONDENT'S REPLY MEMORANDUM."

LYNN A. WILLIAMS,
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PRESS OF BYRON S. ADAMS, WASHINGTON, D. C.

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PETITIONER'S REPLY TO "DEFENDANT'S-RESPONDENT'S REPLY MEMORANDUM."

At the conclusion of his oral argument in this case, Mr. Townsend, counsel for the Respondent, requested and was granted leave to file a "Defendant's-Respondent's Reply Memorandum," which was said by Mr. Townsend to be necessary in order to correct certain errors in the reply brief on behalf of the Petitioner filed at the time of the original argument in April, 1929. No copy of Mr. Townsend's Memorandum had been served or submitted to counsel for the Petitioner

in advance of the oral argument, wherefore the court granted us leave to reply to this Memorandum within four days.

This is our reply.

On pages 17 and 18 of our reply brief we contended that the defendant-respondent's demonstrations or tests of a tank corresponding more or less closely with that of the Smith patent No. 122,498 of 1872 were misleading and inconclusive because of the enormous quantity of water which was admixed with the solid ingredients of the concrete. We had understood the witnesses to say that in some of these tests the water content was two-thirds of the entire volume. Mr. Townsend contends on behalf of the respondents that when the tank was two-thirds filled with water no solid ingredients whatever were used. The demonstration amounted simply to showing that the clear water could be blown out of the tank by the application of air pressure. A re-reading of the rather ambiguous testimony shows that Mr. Townsend may be correct in this regard.

As pointed out by Mr. Townsend, the Smith patent describes a "concrete" so "liquid" or "fluid" that it will not stand in a pile or heap, but will "settle to a perfectly level surface," just like water. Smith described a mixture of one part cement, one part sand, and three parts coarse aggregate, to which water was added in an amount equal to three-fifths of the volume of these solids, and the defendant-respondent's expert, Mr. Wilkins, testified on page 448 of the Record that these were the proportions used in the demonstrations of the so-called Smith apparatus.

On page 9 of his brief, Mr. Townsend concludes some calculations showing this to be the equivalent of

14.3 gallons of water per cubic foot of concrete. Counsel for defendant-respondent attempted to support his argument by incorporating a page of some book in which the permissible quantity of water is shown to vary from five and one-half gallons to eight and one-quarter gallons per cubic foot, depending upon the strength and service required of the finished concrete, where "the space between the aggregate particles is completely filled with *cement paste.*" The "14.3 gallons of water per cubic foot of concrete," as employed in the defendant's demonstrations of the Smith tank is *about double* the eight and one-quarter gallons per cubic foot said by Mr. Townsend's "authority" to be the maximum and extreme permissible quantity of water under *any* conditions whatsoever.

Granting that we were in error in our ascription of two-thirds water, and that we should have said three-fifths water, the fact seems to remain that the tests of the Smith apparatus were made with "concrete" so diluted with water that it would flow like any liquid, but that it would be utterly useless for any of the purposes to which concrete is applied in building or constructional operations.

It would hardly seem necessary for Mr. Townsend to wait until after the close of the oral re-argument in this Court to inject an alleged bulletin of the Portland Cement Association into the Record, since he showed his familiarity with it and apparently referred to it (without offering it in evidence) in his Cross-Examination of the plaintiff's witness, Mr. Robinson, on page 573 of the Record.

Mr. Robinson testified relative to the permissible quantity of water as follows:

> "In mixed concrete 90 to 95 per cent, is solids and the balance water. When there is 90 per cent solids and 10 per cent water you have what I would consider a sloppy mixture. It is the medium (maximum) of sloppiness or wetness and (that) is permissible or feasible for satisfactory concrete construction."

And as there are 7½ gallons in a cubic foot, Smith's 1-1-3 mixture of 5 cu. ft. or 37½ gallons of solids should have not more than 3.75 gallons of water to make "satisfactory concrete construction." This is about *one quarter* of the water given in Mr. Townsend's belated and unverified calculation.

There was no refutation or attempt to refute this testimony.

Again, the mixture described in the Smith patent was one containing five parts of solids and three parts of water, *i. e.*, 37½ per cent water. This is *nearly four times* as much water as contained in the "sloppy mixture" described by Mr. Robinson as resulting from the use of the maximum permissible quantity of water, *i. e.*, 10 per cent.

All of the evidence forces the conclusion that air pressure could be made to force a column of liquid out of the Smith tank, but that "concrete" could be made to flow out of this tank only when it was given the characteristics of a liquid by the addition of much more than three times the maximum permissible quantity of water. The most that can be said of the defendant-respondent's demonstration of the Smith apparatus is that flowability—for a very short distance—was secured at the expense of usability.

The whole matter was quite pithily summarized in the defendant's testimony of R. C. Hackley, the en-

gineer who devised and operated the defendant's machine. Mr. Hackley testified:

"Q. Now, was the concrete which you say you discharged from that tank a week ago, was that such material as is described in this Smith patent where it says here, 'The composition is sufficiently liquid to settle to a perfectly level surface.' Was it of that character?

"A. Yes, it had settled pretty close to a level surface. Some of it would.

"Q. Well, this says 'To a perfectly level surface.'

"A. Well, I don't know whether you would call it perfectly level or not.

"Q. Well, I am asking you, of course, about the material that you used in this machine. Was that of this character which would settle to a perfectly level surface?

"A. No, that would not settle to a perfectly level surface without agitation.

"Q. It would not?

"A. No.

"Q. And it was for that reason that some of this material was left on the flat floor of this tank?

"A. Yes.

"Q. And was not discharged, was it?

"A. Yes sir.

"Q. Now, if you had used enough water in that composition so that it would have the characteristics described by Smith here—that is, being a composition sufficiently liquid to settle to a perfectly level surface, then none of that material would have been left in the bottom of that chamber?

"A. Yes, sir, some of it would have been left.

"Q. It would have?

"A. Yes.

"Q. Why would it have been left?

"A. Because the liquid part would be blown off and leave some of the dry portions in the corners.

"Q. That is, a little sediment would settle?

"A. If there was rock there some of the rock would stay in the corners.

"Q. But in the main, if the material was of a liquid consistency described in this Smith patent, then the bulk of it would go out except for some little settling?

"A. It would gradually collect in there.

"Q. Collect where?

"A. Collect in the corners.

"Q. Then do you claim the material which you did discharge from this flat bottom Smith tank—I suppose that had merely air pressure on top of it?

"A. Yes sir.

"Q. There was no second jet which by its velocity broke up or compacted the concrete material and carried it along through the duct either in slugs or otherwise, was there, in your demonstration of this Smith apparatus?

"A. No, there was not.

"Q. You relied merely on the air pressure supplied to the top of that tank to force the paint-like concrete out of the bottom, did you?

"A. To force the concrete out of the bottom, yes.

"Q. Now, of course, in the Hackley machines which you designed and which you put in use on this Skagit work and at Maloneys, did you say—

"A. (Interrupting.) Yes, sir.

"Q. (Continuing.) —I suppose you have done that elsewhere, also?

"A. Yes, sir.

"Q. You, of course, are not satisfied with and you do not rely upon air pressure on the top of the concrete only, as in this Smith box or tank, do you?

"A. No, sir.

"Q. You have second jets (a secondary jet) which blows a stream of air into the chamber just in advance of the exhaust duct and directed toward that duct, do you not?

"A. Yes, sir.

"Q. Now, of course, there is a reason why you do that, isn't there?

"A. Yes, sir.

"Q. One of the reasons is that you get a different and a better action, don't you?

"A. You start the—

"Q. (Interrupting.) Well, I am asking you. This is cross-examination. Answer either yes or no.

"A. Yes." (R. pp. 433-6)

To us it really does not seem important whether liquid concrete could be made to flow out of the duct at the bottom of Smith's tank by the application of air pressure upon the upper surface of the liquid. It does not seem important to us to determine just what degree of liquidity was required in order to cause a single batch of so-called concrete to flow out through the duct of the defendant-respondent's Smith demonstration apparatus. Whatever happened, or whatever could be made to happen, was not due to the utilization of the McMichael invention. Every one of the claims in suit of the McMichael patent calls in one way or another for the velocity jet located *just at the point where the concrete passes from the chamber into the conduit* so as to break off sub-masses of the compacted concrete and direct them into and through the conduit. The Smith apparatus contained nothing of this kind. For obvious reasons, Hackley was unwilling in his practical and commercial work to employ only the static air pressure of the Smith ap-

paratus, but found it necessary to employ also the *second velocity jet* of the McMichael patent.

We suspect that the purpose of counsel for the defendant-respondent in filing his reply memorandum was not so much to correct our possible error in speaking of two-thirds water instead of three-fifths water in connection with the defendant's demonstration of the Smith apparatus, as to present a *new* theory or contention relative to the mode of operation of the Smith apparatus. *It is to be noted that this memorandum was printed in San Francisco, but was withheld until the argument was closed.*

Nowhere in the record in any of the three suits upon this McMichael patent, nowhere in any earlier brief, and nowhere in the former argument before this court has anyone ever found or attempted to find a velocity nozzle in the Smith apparatus.

But upon his oral re-argument and in his "Reply Memorandum" counsel for the defendant-respondent for the first time suggests that the pipe by which compressed air is supplied to the upper part of the Smith tank acts also as a velocity nozzle to dislodge sub-masses of concrete at the bottom of the chamber and to direct them into the exit conduit. The Smith patents certainly *do not even hint at such* a function or utility. *The idea is not only the gratuitous fancy of counsel for the defendant-respondent, but it seems to us preposterous.* The entire description of the apparatus as it appears in the Smith patent is as follows:

> "When it is necessary to force the liquid up hill, or to convey it quickly or in larger quantities than usual, or through long pipes, or to press it in the mold and expel the air therein, in

> which it might begin to stiffen before reaching its destination, I employ a forcing apparatus to propel it through the pipes, the same consisting, preferably, of a tight chamber, F, capable of resisting great pressure, into which the liquid flows from the mixer, and a pipe, f, by which steam or compressed air can be introduced into the chamber F, *upon the liquid, to force the latter, by pressure,* into the pipe D. *Any other species of forcing apparatus may, however, be substituted, if preferred.*" (R. p. 487.)

Smith's suggestion that "any other species of forcing apparatus" (such for example, as a pump cylinder and piston), might be substituted for the application of air pressure, *negatives any idea of a velocity nozzle.* The entire description of the use of compressed air is confined to its utilization as a means of creating *mere static pressure.* All that Smith had in mind could have been accomplished by an air or steam pipe connected with the upper part of his chamber, F, *at any point and in any direction.*

We do not believe that the air pipe f of the Smith apparatus did anything more than to develop mere static pressure in the upper part of Smith's tank. If it did, it was the purest kind of an accident which meant nothing to Smith and which taught nothing to anybody prior to McMichael, *or in fact to anyone down to the closing hour of the re-argument of this suit.* It is impossible for us to understand, and counsel for the respondent has failed to suggest, how air pressure applied over the top of the liquid concrete in Smith's chamber can result in the delivery of a high velocity jet of air into the compacted con-

crete just at the point where it would emerge from the chamber into the conduit.

But even if one were to accept counsel's fancy in this regard, he would still be left with an apparatus devoid of *the* velocity jet of the McMichael invention. *He would be left with an apparatus which no one has ever been able to use in actual practice or in the commercial conveyance of plastic concrete for any purpose whatsoever.*

The impossible character of Smith's proposal is shown by the first claim of his patent, No. 122,498, which reads:

> "1. The process of laying concrete pavements by *flowing the liquid* material upon the bed of the street, substantially as described."

Counsel for the respondent has not only volunteered his own fancy that the pipe for supplying air pressure to the upper part of the Smith chamber acts also as a velocity jet at the bottom, but he has contributed as equally original and fanciful idea as to why McMichael supplied the velocity jet at the point of emergence from the chamber into the conduit. In his last hour reply memorandum counsel for respondent says on page 10:

> "McMichael had to show in his patent both air pressure on top and at the outlet, because of the U-trap 24 in the discharge pipe. McMichael never built a machine with such a U-trap because it would never have worked. (R. 422.)"

Mr. Kirkland, the chief engineer of the plaintiff, the Concrete Mixing & Conveying Company ever since 1913, testified however:

"Q. In your so-called commercial machine as shown either in Exhibit 16 or 17-a or 17-B here you have this—you have this '24' (the U-bend) that appears in the McMichael patent.

"A. We occasionally use that when a machine in sunk in a pit.

* * * * * * * * *

"When in the use of a vertical McMichael machine which is quite high, it is difficult to raise the concrete up to the top of it and dump it into the machine, we dig a pit and sink the machine down into so that the top of the machine will come at a convenient height for dumping the materials into it. In that case have to have the 'U' bend to carry the discharge out of the pit and on through to its destination. The 'U' bend is still used under these circumstances." (R. pp. 121-2.)

There was no attempt to refute this testimony of Mr. Kirkland, the chief engineer in charge of all of the plaintiff's operations under the McMichael patent, and who was better qualified than anyone else to testify relative to all of the forms in which the McMichael invention has been used and applied. The U-bend "24" of the McMichael patent drawing is sometimes used and is sometimes not used. McMichael's velocity jet is *always* used. *No one has ever been able commercially to effect the pneumatic conveyance of concrete without it.*

The statement that "Hackley uses no air on top of his concrete" is refuted by the very drawing referred to, on page 2 of respondent's brief. Compressed air from the inlets 2, 3 and 4, behind the mass, shoot up and establish an equal pressure in the top of the vessel *the instant they are opened.* Even the nozzle 1 at the outlet will do this, because

of the resistance of the concrete ahead of it filling the relatively small discharge pipe, and the lack of resistance behind it, except for the feeble gravity of the concrete in the vessel. The colored zones in this drawing are, of course, *pure imagination* by counsel and not supported by any evidence.

The statement that the "U-shaped bend" shown in the patent was never used, is also completely answered by the fact that the defendants-petitioners in the Powers-Kennedy case use such a bend. This will be shown by the photograph of their apparatus (Exhibit 3) page 292 of that record, and by the further fact that they use in their conveying conduit, "as high as fourteen 90° bends" (R. P-K 203) and "had no trouble at all" (Id.), as their managing officer, Mr. Kennedy, testifies.

Respectfully submitted,

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In the Supreme Court
OF THE
United States

OCTOBER TERM, 1928

No. 528

4

CONCRETE MIXING & CONVEYING COMPANY
(a corporation),
Petitioner,

vs.

R. C. STORRIE & COMPANY
(a partnership),
Respondents.

BRIEF ON BEHALF OF R. C. STORRIE & COMPANY, DEFENDANTS-RESPONDENTS.

CHAS. E. TOWNSEND,
Crocker Building, San Francisco, California,
Attorney for Defendants-Respondents.

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In the Supreme Court
OF THE
United States

OCTOBER TERM, 1928

No. 528

CONCRETE MIXING & CONVEYING COMPANY
(a corporation),
Petitioner,

vs.

R. C. STORRIE & COMPANY
(a partnership),
Respondent.

BRIEF ON BEHALF OF R. C. STORRIE & COMPANY, DEFENDANT-RESPONDENT.

(For the convenience of the Court a list of plaintiff-petitioner's and defendant-respondent's exhibits appears in the index; page reference to the printed record being designated by "R." The petitioner will be called plaintiff and the respondent-appellee, the defendant. All boldfaced type or italics wherever occurring herein unless otherwise specified are ours.)

STATEMENT.

Plaintiff brought suit in the Western District of Washington, charging infringement of McMichael

Patent Number 1,127,660, issued February 9, 1915 on an application filed January 14, 1907, relating to the conveying of concrete by means of compressed air.

The charge of infringement against defendant was predicated on their use as contractors for the City of Seattle on the so-called Skagit River project, of a Hackley pneumatic concrete conveying machine or "concrete gun," built under the Hackley patent Number 1,619,297, dated March 1, 1927.* (Defendant's Exhibit 187, R. 78 of Exhibit Book.)

The two devices (plaintiff's and defendant's) are quite different from one another. They are not only different in construction and appearance but are radically different in principle and mode of operation.

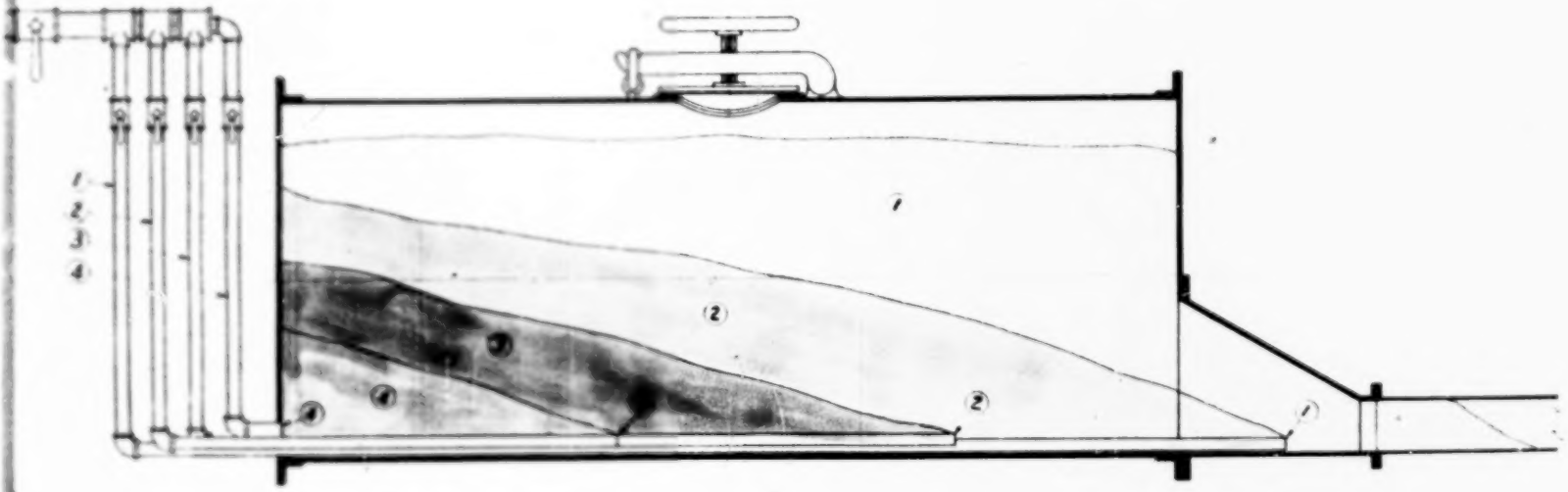
The McMichael device is a vertical container with a tapered bottom, very much in appearance like an inverted milk can only larger.†

The material is delivered into the container at the top and the cover then placed in position so as to make the interior air-tight. Air is then let into the top and the material is blown out through a discharge pipe at the bottom; the discharge being assisted by a secondary air jet or booster jet acting very much on the same principle as a steam injector.

***DEFENDANT'S ENLARGEMENTS.**

* The Court's attention is directed to the amounted enlargements by defendants offered in evidence or which will be used at the argument, to illustrate the true Hackley construction, and also more important patents and some of the publications and uses to which we shall refer in this brief.

†The Canniff machine in evidence (Exhibit 179), which considerably preceded McMichael, will give the Court a good idea of the construction and operation of a McMichael machine.



LONGITUDINAL SECTION OF HACKLEY CONCRETE GUN
Showing Scheme of Discharging Concrete.

DEFENDANT'S APPARATUS.

The apparatus charged to infringe is that illustrated in the Hackley patent. (Exhibit Book, p. 78; Defendant's Exhibit 180—Enlargement; and also in the photographs Exhibits 181-2, Exhibit Book, pp. 683-4.)

Fig. 1 (enlargement Exh. 180) of the Hackley patent is a correct drawing of the defendants' apparatus used at the Skagit job and charged to infringe. It has four pipes numbered 14, 15, 16 and 17 for admission of air into the **bottom** of the receptacle and **at no other place.**

We produce opposite a correct drawing of the Hackley gun, with its four inlet pipes numbered 1, 2, 3, 4, arranged to discharge in tandem fashion at the very bottom of the tank. **There are no other air pipes in the receptacle and no provision made to admit air at any other point.**

Defendant's machine admits no air to the top of the chamber above the concrete. It blows the concrete out of the horizontal receptacle or gun by a series of air jets in the bottom of the receptacle acting to tunnel out the mass by entraining it with the air from the jets.

As Hackley says in his patent specification (p. 1, lines 66-74):

> "By reason of the separate controls for each of the branch pipes, any one or all of these pipes may be cut in or out, as desired. At the outset it may be necessary only to use the pipe 14, until the concrete near the nozzle is discharged, whereupon the pipe 15 can be turned on, and thereafter

the remaining pipes in succession, until the tank is entirely empty."

And again (p. 1, lines 78-87):

"**There is no need for maintaining any air pressure on top of the body of the concrete.** Hence, with the present apparatus, the concrete does not tend to pack or bridge around the nozzle, as is the case where vertical tanks are used. The mass of concrete which any one air stream is compelled to move is relatively small and unpacked, and therefore the device operates quickly and easily and without danger of becoming clogged."

Referring to the colored plate of Hackley, supra, the gun is shown as charged with concrete and ready to discharge, with the concrete divided into colored sections numbered 1, 2, 3 and 4, corresponding to the respective and similarly numbered air inlet pipes; **these colored numbered divisions representing the portions which are entrained and discharged by the correspondingly numbered air jets in succession.** In practice air inlet pipe 1 is first turned on. This causes an underneath tunneling effect on the superposed concrete mass, colored yellow. As soon as or just before air jet 1 has effected its purpose, jet 2 is turned on and similarly blows out the portion of concrete or a part substantially conforming to the blue portion 2, pipe 1 remaining open and assisting in the discharge. Then jet 3 is turned on to discharge the mass corresponding substantially to the part marked 3 in red, being assisted by the jets 1 and 2; and finally jet 4 is turned on to blow out the remaining portion of the concrete mass colored green.

The manipulation of the air jets is such that the discharge takes place substantially continuously to give an even, steady and comparatively smooth flow. At all times care must be used not to blow the concrete out explosively so as to injure or destroy the forms or displace the metal reinforcements.

Furthermore, there is a sound reason why Hackley does not admit air to the top of his concrete: The Hackley apparatus being a **horizontal** one with a convergent forward discharge, if **air pressure were applied on top of the concrete in Hackley, it would be of no value since it would escape through the discharge pipe following lines of least resistance and without doing any good.** In fact, it would interfere with the proper functioning of the Hackley principle of undercutting or tunneling the concrete out by the bottom air jets. In McMichael and in Smith the apparatus being vertical and the discharge being at the bottom, it is practicable and necessary in fact to use top air pressure.

PLAINTIFF'S DECEPTIVE DRAWING OF DEFENDANT'S MACHINE.

The Court is cautioned concerning plaintiff's misleading Exhibit 13 (R-84 Exhibit Book), purporting to show the Hackley machine. This drawing is reproduced twice in plaintiff's brief: opposite pages 22 and 76. Not only was this machine never used but there is serious doubt if it ever existed. **All witnesses say it was never used.** Yet plaintiff says of this trick drawing, page 2 of its brief:

> "The drawing, Exhibit 13, shows an early form of the respondents' (Hackley) machine **as used** at the Skagit River Project."

The same misstatement is repeated at page 22.

Hackley on the stand, when called as the first witness for plaintiff, pointed out the errors in plaintiff's Exhibit 13, at least one of which most glaring errors (pipe 27A) plaintiff admitted by correcting the drawing in red pencil. **Upper pipe 27 (whatever its intended purpose may have been), was never used at any time by anybody.**

Plaintiff sought to justify this drawing Exhibit 13, by the witness Oxenham, who proved on cross-examination (R. 82) to be a Mortgage Loan Clerk with no interest in nor special knowledge of concrete handling machines; never had seen one before and had never seen one since; was not an engineer nor even a draftsman; did not make the drawing and did not know who had made it, but **thought** it was made in the office of the plaintiff's attorneys in Chicago; nor had he taken any notes when he casually visited the Skagit Tunnel on October 10, 1923 (four years before he testified!).

Exhibit 13 was twice rejected when offered in evidence (R. 77 and 87). It was first offered and rejected (R. 77):

> "Mr. Townsend. We object to that as no proper foundation having been laid. * * * The witness has said that it is not a correct drawing of his apparatus.
>
> The Court. It will be rejected at this time. Make one, if you can, based upon the witness' testimony.

> Mr. WILLIAMS. I would like to have this drawing that the witness has testified regarding marked for identification as Plaintiff's Exhibit 13."

At R. 87, during the examination of Mr. Hackley, a further effort was made to introduce it without success, and at that time **Mr. Hackley stated positively that pipe 29 was never in there.**

Thus (R. 87):

> "Mr. WILLIAMS. I think now with this further testimony I shall offer in evidence the drawing which was formerly marked for identification as Exhibit 13. I think that is sufficiently established now.
>
> The WITNESS. **That pipe never was in there.**
>
> Mr. TOWNSEND. **29 you mean?**
>
> The WITNESS. **Yes.**
>
> The COURT. The objection will be sustained. Get a correct drawing made and you can produce it, and **do not produce one that may mislead the Court.** * * *"

If the pipe 29 was never there, and its existence is so critical to plaintiff's case, then we insist that plaintiff's persistence in using this drawing justifies the view that it is an attempted imposition upon this Court, the observation of the trial Judge that the presence of such a drawing in evidence "may mislead the Court."

Nothing daunted, plaintiff again sought to justify this drawing, and, despite the positive testimony of Hackley and the showing of the Hackley patent and drawings, finally succeeded in getting their witness Brock (R. 131-2) to say that pipe 29 was on the machine but that it **was never used.** Under such doubt-

ful circumstances the drawing appears in evidence but apparently was not considered worthy of probative value by either the trial Court or the Appellate Court.

Why the appellant so persistently clings to its bogus drawing (Exhibit 13) and deliberately shows an air pipe leading to the top of the chamber, and which pipe does not exist in the Hackley machine, is difficult to conceive unless prompted by some sinister motive to make the Hackley machine out to be something that it is not.

IMMATERIALITY OF ACTIONS IN THE PATENT OFFICE ON THE HACKLEY PATENT.

In order to create a similarity that does not exist between Hackley and McMichael, the plaintiff sought on the trial to introduce a part of the Hackley File Wrapper to show that the specification as issued differed in its language from the original incorrect specification filed on behalf of Hackley. Plaintiff's counsel quote from a part of the original specification and comment on it at length (pp. 24-25 in their brief).

The Hackley patent of course is not on trial. It is in evidence (Exhibit 187) to illustrate and describe the Hackley machine.

Aside from the fact that the Hackley **patent as issued** correctly describes the Hackley machine, such alleged evidence, regarding something that may have taken place **ex parte** in the Patent Office while the Hackley patent was pending, and in regard to which neither the plaintiff nor the defendant were involved nor concerned nor bound, is clearly improper.

> "In *Westinghouse v. Boyden Power Brake Co.*, 170 U. S. 582, 18 Sup. Ct. 707, the court, after alluding to the fact that in case of ambiguity it may be allowable to consult the application and file wrapper 'and possibly written communications which may throw light upon claims that are ambiguous or capable of different constructions,' said:
>
> 'But where the claims allowed are not uncertain or ambiguous, the courts should be slow to permit their construction of the patent actually granted and delivered to be affected or controlled by alleged interlocutions between the officers in the Patent Office and the claimant.'"

Certainly if this rule applied to unambiguous **claims** of a patent **sued on,** it must apply with greater force to the unambiguous **specification** of a patent **not in suit.**

Hackley's gun was evolved from necessity, because the work done by the McMichael* gun on the Skagit job was condemned by the City's Engineers of Seattle as unsatisfactory (R. 421).

NON-INFRINGEMENT WAS THE ESSENTIAL FINDING IN THE NINTH CIRCUIT CASE.

Following the trial lasting several days, the trial judge held that defendants' structure did not infringe plaintiff's patent (R. 610; 23 Fed. (2d) 131). The Court further found that in view of the state of the art the patent was invalid. Or as the Circuit Court of Appeals said in its "Statement of Facts" (R. 668), "* * * the court below found * * * that **even conceding its validity,** it **had not been infringed by the appellee."**

---

* The McMichael structure first used on the Skagit River job and which was discarded as impractical by the City's Engineers, was a licensed machine and is not here involved.

From the ensuing decree plaintiff appealed to the Circuit Court of Appeals for the Ninth Circuit. In a carefully considered opinion that Honorable Court affirmed the lower Court in all particulars (R. 666; 29 Fed. (2d) 838).

DIFFERENT RECORDS AND DIFFERENT DEVICES IN THE NINTH AND SECOND CIRCUIT CASES.

Previously the same patent, but on a very different record indeed, had been before the United States District Court for the Southern District of New York in the so-called *Ulen* case (12 Fed. (2d) 929), which decision was affirmed by the Court of Appeals for the Second Circuit without an opinion (12 Fed. (2d) 931). In that case the Court found infringement as a necessary consequence.

From drawings appearing in petitioner's brief opposite page 76, apparently in the Ulen device, the concrete was admitted into a chamber in front of a piston and was expelled by piston action; possibly assisted by some air pressure.

Moir Patent No. 778,878, dated January 3, 1905 (Defendants' Exhibit 146, Book of Exhibits 520), is an apparent replica and an anticipation of the so-called Ulen device.

As showing how uninformed the Court was in the *Ulen* case of devices of the prior art, attention is called to Figure 1 of the Moir patent (page 520, Book of Exhibits).

In Moir the same sort of a horizontal apparatus with expelling piston is used **in tunnel lining,** but without any supplemental air. Note the following from Moir (p. 522, Book of Exhibits):

"This invention relates to apparatus which is adapted to facilitate the supply under pressure of lime-grout, liquid cement, or other viscous fluids which have the quality of quickly solidifying for the purpose of filling up vacant spaces—as, for example, the spaces surrounding the metal sections which form the lining of tunnels of modern construction. **According to the arrangement at present in use for this purpose in tunnel construction a mixing vessel is provided having a cover which is adapted to be opened to receive the materials which compose the grout and to be closed in an air-tight manner after the mixing has been effected.** Air under considerable pressure having previously been forced into a reservoir by an air-pump driven by an engine or otherwise, a **communication is made between the reservoir of air and the upper portion of the mixing chamber,** and the grout is thereby forced through a stop-cock opened for the purpose into a flexible pipe which leads to the place where it is wanted. Delay in starting the forcing of the grout or any subsequent cessation of the forcing which may occur before the vessel and delivery-pipe are emptied of their contents gives an opportunity for the partial setting of the grout and necessitates the provision of a very considerable pressure in the air-reservoir to overcome the initial resistance on starting or restarting, whereas a very moderate pressure will in general be sufficient to maintain the flow of grout against the normal working resistance."

IF ULEN INFRINGED, MOIR ANTICIPATED McMICHAEL.

It certainly required no invention, **in view of the notice Moir gives of the use of compressed air for expelling cementitious mixtures,** to have incorporated that feature into his patent.

We venture to say that if the Moir patent had been brought to the attention of the New York Court in the

Ulen case, it would have applied the maxim that "That which infringes, if later, anticipates, if earlier;" and, therefore, the Ulen device being similar to Moir and defendant contending that Ulen infringes McMichael, Moir anticipates McMichael.

This is mentioned merely to show how different our record is here from those of the New York cases.

In the subsequent *Powers-Kennedy* suit (27 Fed. (2d) 668), in the same District, before the same Court, on what was substantially the same record that was before it in the *Ulen* case and on a structure even more closely resembling the McMichael structure than did the Ulen structure, the Court quite naturally found the patent both valid and infringed.

NON-CONFLICT OF DECISION ON INFRINGEMENT.

In finding non-infringement of McMichael by the Hackley device Judge Bourquin said (23 Fed. (2d) 131, 132-3):

> "The charge of infringement against defendants is predicated upon their use of Hackley's apparatus patent 1,619,297 of 1927. This latter is an oblong container, ovoid in cross-section, without upper air pipes. The discharge pipe is at the bottom and one end, and the disposition of the lower air pipes is entrance at the bottom, pointing towards the discharge pipe, one opening into the entrance of the latter, one opening into the opposite end of the container, and between them open the other two and equalizing the distances between all of them in order. In operation the container filled, the air is first admitted through the pipe opening in the entrance to the discharge pipe, and thereafter through the others progressively to the rear as the concrete subsiding in

front of them is driven out through the discharge pipe."

And (p. 135):

"That serves to dispose of the case, and the defense of non-infringement needs no more consideration than to note that Hackley's apparatus is a different combination than McMichael's, has no upright cylindrical hopper bottom container, is without the U-bend, employs no upper air, save some incidental back pressure, does not discharge slug fashion, as claimed is the invention of McMichael, and so **does not infringe.**"

CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT.

The Ninth Circuit Court of Appeals necessarily affirmed the finding of non-infringement when it affirmed the lower Court's decree.

The Appellate Court clearly appreciated the differences between the Hackley Gun and the McMichael device and that these differences were differences in principle fully sustaining the trial Court's finding of non-infringement, for in conclusion the Appellate Court said (p. 841):

"whether or not the appellant's apparatus operated to deliver concrete in slugs or sections, it is very clear that the Hackley apparatus operates in delivering a constant stream of concrete, interrupted only so far as it is interfered with by the air which accompanies it through the discharge pipe. Hackley used a horizontal tank, and in his specifications he said: 'With the present apparatus the concrete does not tend to pack or bridge around the nozzle, as is the case where vertical tanks are used. The mass of concrete which any one air stream is compelled to move is relatively small and unpacked, and therefore the device operates quickly and easily, and without danger of becoming clogged.' **The**

decisions in Concrete Mixing & Conveying Co. v. Ulen Contracting Corp. (D. C. 12 F. (2d) 929, and Concrete Mixing & Conveying Co. v. Powers-Kennedy Co. (C. C. A.) 27 F. (2d) 668, relied upon by the appellant, were based on records widely different from that in the case at bar.

"The decree is affirmed."

That the Second Circuit's decisions finding validity **and infringement** are not in conflict with the foregoing finding of the Ninth Circuit is likewise recognized by the Second Circuit Judges, for they use language not dissimilar to that just quoted above from Judge Gilbert's decision. Thus Judge Swan, speaking for the majority of the Court, said (27 Fed. (2d) 668, 670):

> "In the suit against Storrie & Co., Judge Bourquin seems to have relied to some extent, at least, upon **patents which were not in the record in the Ulen Case and are not now before us.**"

What is, however, of more importance is that as already pointed out, the respective **defendants' devices** in the two cases (the Powers-Kennedy device and the Storrie device) were very different and **fully justified different conclusions as to infringement in the two cases regardless of validity.**

Such conclusions are not necessarily in conflict and do not of themselves give rise to such alleged conflict of decision as to warrant this Court in taking jurisdiction of these cases. As far as the Ninth Circuit is concerned, that Court has said that the Hackley patented device, under which the Storrie Company operated, would not infringe, even assuming the McMichael patent valid. In other words, a review of the records here would not alter the finding one way or the

other in the *Storrie* case, since infringement being a **question of fact** the findings of the lower Courts on that question will stand disturbed.

> "Infringement is a question of fact. * * * This Court accepts the findings of fact made by the Court of Claims and cannot review them." (*Stilz v. United States*, 269 U. S. 144; 70 L. Ed. 202.)

Previously this Court has said in the Paper Bag cases, 210 U. S. 405, 28 Sup. Ct. 748; 52 L. Ed. 1122:

> "The lower courts, therefore, found that the invention was a broad one, and that the machine used by the Continental Company was an **infringement.** And these were **questions of fact** upon which, both of the courts concurring, their findings will not be disturbed, unless clearly wrong."

This Honorable Court is, therefore, confronted at the outset with the question as to whether the writs bringing these cases here were granted inadvertently or not.

Keller v. Adams-Campbell Co., 264 U. S. 314, 68 L. Ed. 705;

Layne & Bowler Corporation v. Western Well Works, 261 U. S. 387, 67 L. Ed. 712.

THE RECORDS.

The record in the *Storrie* case is very different from the records before the New York Courts:

(a) Now, and for the first time, the correct principle of operation of these devices has been fully developed.

(b) Prior uses, prior patents and publications and practical demonstrations not before the New York Court were here offered by the defendants and considered by the Honorable Trial Judge and by the Ninth Circuit Court of Appeals.

(c) The decision in *Concrete Appliances Co. v. Meinken,* 262 Fed. 964 (6 C. C. A.)* principally relied upon by the New York Court in the *Ulen* case as to what in the law of patents constitutes "double use" or "analogous use," was subsequently overruled by this Honorable Court in *Concrete Appliances Co. v. Gomery,* 269 U. S. 177.

Subsequently the Third Circuit Court of Appeals, considering the same patent, in *Concrete Appliances Co. v. Gomery,* 291 Fed. 486, held that **to employ apparatus and methods formerly used in handling grain, coal, etc., for purpose of distributing concrete was not invention.**

The two cases were then brought to this Court on certiorari and this Court in 269 U. S. 177, supra, sustained the Third Circuit. That finding of this Honorable Court was taken by the Ninth Circuit Court of Appeals as the law of the present case.

HISTORY OF THE McMICHAEL INVENTION.

While considerable testimony was offered on behalf of plaintiff to establish commercial success for the

*That suit and *Concrete v. Gomery,* 291 Fed. 486, post, both involved the Callahan patent 948,719 for "Material Transferring Apparatus" designed for flowing concrete or other plastic materials from a suitable source of supply to working points on a building under construction.

McMichael device, that evidence is not entitled to much weight under all the circumstances.

No extent of use of a patented article can supply the want of actual invention or cure the vice of mere aggregation of parts.

Adams v. Bellaire Stamping Company, 141 U. S. 539, 12 Sup. Ct. 66, 35 L. Ed. 849;

Lehigh Valley R. Co. v. Kearney, 158 U. S. 461, 15 Sup. Ct. 871, 39 L. Ed. 1055.

The record is silent as to who McMichael was or what he had done, if anything, with his invention prior to the filing of his application on January 14, 1907. McMichael died many years ago. Aside from this record date and the history of the patent application in the Patent Office, as shown by a certified copy of the file wrapper and contents (Defendants' Exhibit 134), the first heard of McMichael is in 1909.

Mr. Kirkland, plaintiff's engineer, testified (R. 98) that he had been with plaintiff since 1913 and first heard of the McMichael apparatus in Cleveland, Ohio, **in 1909:**

> "I heard that McMichael was **experimenting** with a machine on the Dennison Viaduct where he was placing concrete through a 6″ pipe, 80′ in height. I was then engineer for the contractor in charge of the construction of the Rocky River bridge there.* This was in 1909."

* For some unaccountable reason this condensation by plaintiff omitted the further important statement by the witness Kirkland which appeared in the record in the Court below where the witness said following the word "there": **"and we considered the use of sand apparatus for placing concrete in our arches".**

Possibly the reason the appellant suppressed that statement of Mr. Kirkland was because a "sand apparatus," i. e., the sand blast machine, was the most natural thing to be suggested to the mind of an engineer like Mr. Kirkland. In fact, **the McMichael apparatus is only a "sand blast apparatus" applied to a slightly different use.** (See Kolsche patent, R. 659, Book of Exhibits.)

Previously (R. 94) Mr. Kirkland said it was about 1909 that the plaintiff began making and leasing the McMichael apparatus. The McMichael file wrapper reproduces (pp. 269-271 Exhibit Book) an article published in "Engineering News" August 10, 1911, descriptive of a McMichael apparatus, modified from the patent drawings, however, where the secondary air was let in at an elbow of the discharge pipe exteriorly of the cement container. (See enlargement.)

That article, descriptive of the McMichael device, is most instructive, and, as an admission against interest, goes far to disprove many of the arguments advanced here for the plaintiff. For instance, plaintiff-appellant lays great stress on the use of the McMichael apparatus for shooting concrete only, and that a grout gun is not applicable for shooting concrete; **whereas this article says that the said McMichael apparatus was actually used for conveying both concrete and grout.** Thus:

> "An interesting application of this device is in delivering the concrete for the lining of the La-Salle St. tunnel under the Chicago River. * * * * * * * * * * * *
>
> **"The same machine had been used previously in grouting the broken stone dumped inside the cofferdam at the connection with the north approach or shore tunnel.** Before dumping the stone, vertical 2-in. grouting pipes about 4 ft. apart were secured in place, their lower ends extending to within 6 ins. of the bottom. A hose pipe was attached to each pipe in turn and two 8-ft. layers of stone were grouted in this way. The grout was forced to a total depth of 52 ft. from the mixer and was discharged under water,

the cofferdam not being pumped out. It also forced its way under the tubes to a horizontal distance of 27 ft. from the pipes."

How does plaintiff-appellant have the face to contend now that grout guns of the prior art, working just as McMichael works, are not pertinent art?

CONCRETE AND GROUT.

The term "concrete" as used in concrete work hardly needs definition. It is widely used in buildings, in roadwork, sidewalk construction, etc. It is usually a flowable mixture of cement, sand, gravel, broken rock and water.

"Grout" differs from the ordinary concrete only in degree of flowability. **Grout is Liquid Concrete.***

"Cement" is the active element of both "concrete" and "grout."

The machines for shooting "concrete" and "grout" are used interchangeably. This is particularly so

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*See Defendants' New York Exhibit 111, Lewis & Chandler "Popular Handbook for Cement and Concrete Users" by Norman W. Henly Pub. Co., 1911, pages 375-385; see enlargement of first page.

Cement and concrete were known to the ancient Egyptians 4000 years before the Christian era.

The Romans built aqueducts, tunnels, sewers and buildings of it. The Parthenon, whose dome is 142 feet in diameter, has withstood the ravages of 19 centuries.

The manufacture of hydraulic cement was a lost art during the Middle Ages, and was rediscovered by John Smeaton in England in 1756 in building the Eddystone Lighthouse.

A history of cement and concrete is given in Reid's "Concrete and Reinforced Concrete Construction" (1908).

The first use of reinforced concrete was at the Paris World Fair—1855—where a small boat of wire netting and cement was exhibited. (Reid p. 4.)

The first reinforced bridge in the United States was built in Golden Gate Park, San Francisco, in 1889, by Ransome & Smith. (Reid p. 5.)

with Defendants' apparatus known as the "Hackley Gun." (R. 425; photographs, Exhibits 181-2.)

CONCRETE AND GROUT DIFFERENT ONLY IN DEGREE; BOTH A CONCRETE.

As Judge Bourquin said (R. 616):

> "The variety of concrete is not material, save in respect to the mere incidentals of pressure and size of container, load, and discharge conduit.
>
> "In any apparatus, including McMichael, the concrete must be flowable in quality, and the pressure in due proportion to the weight and friction of the load ahead of it. To suit these incidentals to circumstances is mechanical, and not invention.
>
> "And this is true, be the container capacity or load discharged in one slug (continuous stream) or in several shorter slugs."

WITH THE ADOPTION OF "WET" CONCRETE AS RECOGNIZED STANDARD PRACTICE THE ADOPTION OF THE CONCRETE GUN WAS A MATTER OF COURSE.

We do not find any impressive adoption and acquiescence favoring McMichael. The growth in favor of the concrete gun has been one of gradual development and of increased use of wet or "flowable" concrete; a situation closely paralleling that set out by this Honorable Court in *Concrete Appliances Co. v. Gomery*, supra:

> "The fact that so many persons caught the idea goes rather to prove that it was simple and obvious, and not that it required inventive genius to conceive. It is not like the case where the art is

waiting for the device, and inventors striving unsuccessfully to produce it, under which circumstances invention may well be held to appear." (*Elliott & Co. v. Youngstown Car. Mfg. Co.,* 181 Fed. 345, 349.)

FLOWABILITY.

The requirements of a concrete mixture suitable for shooting by compressed air were admitted by plaintiff's witness Mr. Robinson (cross-examination on rebuttal) of the Ransome Company, to be that specified in a publication of the "Portland Cement Association" and read to and approved by the witness:

"TRANSPORTING CONCRETE:

"As in the case of measuring equipment, selection of means of transporting from the mixer to place of deposit is primarily a question of economy, the only qualification being that the means selected must not interfere with the delivery at the place of deposit of concrete of the proper quality. **The design of the mix may be governed largely by the type of equipment to be used in transporting concrete.** If chuting equipment is to be used the slope and length of the chute may be adjusted to permit the movement of the desired mix or the mix may be adjusted to fit the slope of the chute. **The extra cement required to maintain quality with the increased flowability** may easily be justified by the saving in transportation costs.

* * * * * * *

"CARE IN PLACING:

"No element in the entire cycle of concrete production requires more care than the final operation of placing concrete at the ultimate point of deposit. With a well-designed mixture delivered with proper consistency and without

segregation, placing of concrete is greatly simplified, but even in this case care must be exercised to further prevent segregation and to see that the material **flows readily** into the corners and angles of forms and around the reinforcement."

SOME FACTS OF COMMON KNOWLEDGE.

Having in mind *Concrete Appliances Co. v. Gomery*, supra, this Court will take judicial notice of the following facts leading up to the natural adoption of wet concrete and flowing it either by gravity or by air pressure to the desired point of deposit.

Previous to 1900, or thereabouts, we had the following situation:

Abundant labor at low costs.

Lack of capital to buy plant and equipment.

Lack of convenient mechanical equipment and electric power for construction jobs.

Concrete specifications called for dry rammed concrete—many engineers looked unfavorably on machine-mixed concrete.

As a result brick and mortar were largely used in building construction. Masonry was used largely on dams instead of concrete. These types of construction required a minimum of lime or cement; a maximum of labor. Tunnels were largely lined with timber, timber being replaced from time to time as it decayed. Concrete was little used for tunnels—where a permanent lining was used, brick was the more common selection.

By 1905 the transition from the use of man power to mechanical agencies was in full swing. In the concrete industry this was brought about by the following:

1. Electric power lines were being extended, making the more convenient electric motor available to operate constructive equipment.

2. Engineers were using reinforcing steel much more extensively. This required a change from dry, stiff concrete to plastic concrete. With abundant power, rock could readily be crushed to smaller sizes, thin, reinforced walls of rich, plastic concrete became the practice instead of the heavy gravity walls of the past.

3. Constructors quickly and naturally turned to the methods of other industries—they mixed the plastic concrete in machine mixers instead of by hand, **they flowed their concrete in chute lines as the grain storage plants and other industries flowed their products.** With machinery made more and more convenient and sources of power more at hand and at the same time with hand labor more scarce and at a disadvantage as to unit costs, a great impetus was given to the change.

4. The San Francisco earthquake and fire in 1906, destroying many brick and wood buildings, was a very strong factor in the change to steel and concrete construction.

5. During the same period compressed air began to be available at lower cost and with a greater degree of convenience.

While Smith* had invented a concrete gun in 1872, and was one of the earliest advocates of a plastic concrete that would flow, it required another 30 years for the country to be ready to use his invention by the advent of the automobile and the demand for concrete highways.

Thus about 1905 we find many inventors and users applying compressed air to move grout and concrete, as other industries had previously been using similar installations to move water, sand, grain, mud, rock, sulphur, paint and innumerable other materials.

As the Court of Appeals in the *Concrete Appliances* case, supra, said (p. 492):

> "In the advance in the concrete building art, with the extension towers to great heights and chutes to great distances, the very magnitude and scale of the work are such as to impress the onlooker, and there is danger of one's being misled by their very magnitude into the belief that they must involve invention; but when their principles is sensed it will be found the known principles and practice, which marked the art long before this patent, have simply enlarged as construction enlarged its operation.
>
> "That growth is in this case due to the appreciation of wet concrete, and convinced as we are that in roads, piers, docks, bridges, and buildings generally concrete is the growing material of the future, we believe its advance should be in no way embarrassed by this patent, by which the art is now sought to be blanketed. The court below held the patent was not infringed. We go a step further, and hold Callahan, so far as the claims here involved are concerned, had no such patent claims to infringe."

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*Patent Exhibit 141, Exhibit Book p. 483; Smith machine, Exhibit 186, R. 430.

The two specific proven instances of the use of the McMichael gun mentioned on the stand utterly disproved the extravagant claims made for McMichael by the plaintiff:

(1) Hackley shows that the reason why his gun came into being was because the principle of the McMichael gun was such that the latter was thrown off the Skagit job by the City of Seattle. (R. 77, 421.)

(2) Mr. Peterson on cross-examination testified in regard to his company's experience with a McMichael gun in 1916 in Placer County, California, that it was so unsatisfactory and so **much more expensive** than **hand labor** that they threw McMichael out and went on with hand labor for several years and until the appearance of the Hackley gun. (R. 475.)

THE McMICHAEL PATENT IN SUIT. (p. 320, Exh. Book.)

The patent in suit contains 35 claims, of which Numbers 1, 2, 17, 18, 24, 29, 34 and 35 are alleged to be infringed. Stripped of meaningless words, the broadest of these claims cover the bare thought of filling a hopper with concrete, making the hopper air-tight, and introducing air under compression into the hopper, to force the concrete out through a discharge pipe to the desired place of use.

As originally filed, the McMichael application was for "Improvements in Apparatus for **Transporting Granular and Plastic Building Material such as sand, plaster, Mortar and Concrete.**"

During the more than eight years the application was pending it underwent many and questionable changes; the patentee and the plaintiff taking advantage of every delay known to the law.

THE McMICHAEL FILE WRAPPER AS EVIDENCING DELAY IN THE PATENT OFFICE, TO PROLONG MONOPOLY.

A certified copy of the McMichael File Wrapper and Contents is in evidence as "Defendant's Exhibit 134." (pp. 193-328, Book of Exhibits.) It shows all the proceedings in the Patent Office as far as they are matters of record.

The original application was filed January 14, 1907; first allowed February 23, 1910; allowed to lapse and renewed January 23, 1911; reallowed July 11, 1914; final fee paid January 11, 1915, or on the last day allowed by law. The patent finally issued February 9, 1915, or more than eight years after it was first filed in the Patent Office.

The statute permitted one year between office actions; that is, within one year after a rejection applicant must amend and make reply. Where the first allowance lapsed the statute provided that within six months thereafter the application might be renewed.

The plaintiff took advantage of every delay known to the law.

While these expansions, additions, circumlocutions and delays may not in law justify the Court in holding the McMichael patent invalid it savors of a practice not commending itself favorably to a Court of Equity,

particularly where as here the Smith, Canniff, McIlvrid, Buzzell and Larkin patents have expired, and industry finds progress blocked for years to come if the McMichael patent were upheld, simply by a prolonged monopoly never within the intention of Congress.

This patentee may have been "within the law" technically. While his patent is not made actually void by his dilatory tactics in the Patent Office yet the courts take much notice of such conduct in construing and considering patent claims and have shown themselves strongly averse to sustaining monopolies engineered and prolonged by such questionable methods. (*American Bell Telephone Co. v. National Tel. Mfg. Co.*, 109 Fed. 976; *Herzog v. New York Telephone Co.*, 176 Fed. 349; *Union Sulphur Co. v. Freeport Texas Co.*, 255 Fed. 961.)

In the last mentioned case involving the Frasch Sulphur mining patents here in evidence, the Court said (p. 980):

> "* * * by a consistent series of delays in procedure, whereby the grant of such patents was delayed until 1905. While such course is legal and involves nothing censurable, yet when the practical effect, if the patent is enforced, as now contended for, be, as we have said, to shut out the public from the field of underground sulphur liquefying for 31 years, it behooves a Court, before following such a course, to take great care to avoid being led to a decision which, instead of fulfilling the constitutional purpose of promoting the progress of science and useful arts, in reality blocks the path of improvement."

The McMichael application originally contained six claims, claim 1 of which is typical:

"1. In an apparatus for elevating and transporting **granular and plastic building material**, a closed receiver provided with means for introducing **material** therein, means for supplying air under pressure to the receiver, and a tube to convey the **material** therefrom." (No specific mention of "concrete." The original specification describes the "building material" as "**sand,** plaster, mortar **and** concrete." Page 197, Book of Exhibits.)

In plain language it calls for three things:

(1) A closed receiver 11,

(2) the air pressure pipes 8 or 10 or both,

(3) the discharge pipe 13.

On the first action of January 24, 1907, (promptly taken ten days after filing) this claim and all the claims except claim 3 which was specific to the McMichael structure and terminated with the words "substantially as described" were rejected on references.*

Applicant waited until January 18, 1908, or practically 51 weeks after the first Patent Office action wherein to make reply. This, applicant did, by cancelling claim 1 (quoted above) and claims 4 and 6 and substituting a new claim 4 with a short argument in an attempt to differentiate McMichael from the prior art cited.

Within ten days after this argument was filed the Patent Office on February 4, 1908, (Paper No. 3) allowed two of the four claims, rejecting the others

*At no time did the Patent Office cite the Smith 1872 concrete patent nor the Duckham patents nor any of the other prior art relied on here. The art relied on by the Patent Office had mostly to do with grain and coal conveyors for handling dry materials.

on a new reference—Rosenthal, No. 759,750, dated May 10, 1904, no better than the others.

Applicant again rested a year to a day and on February 4, 1909, filed an amendment cancelling the rejected claims and inserting one in place of the two thus cancelled, leaving two claims in the case and seeking to differentiate the McMichael structure for transporting concrete from other air conveyors cited by the Patent Office.

The next Patent Office action on March 9, 1909, (Paper No. 5) resulted in the citation of three new references and a rejection of all of the claims.

Thereafter and on March 25, 1909, the Patent Office having found certain claims allowable to other parties suggested these claims under rule 96 of the Patent Office to McMichael for the purpose of Interference and gave McMichael twenty days within which to copy them if he desired to enter into the Interference. This was done by an amendment filed April 8, 1909, these four claims being then the only unrejected claims in McMichael.

The history of the McMichael invention discloses an unusual situation and three-fold aspect:

(1) The invention as McMichael applied for it in 1907.

(2) The invention as it finally appeared in the patent as issued in 1915.

(3) The invention which plaintiff now contends for but which was neither originally shown nor described, nor was it suggested as the patent finally issued. (We refer to the so-called "slug" theory of

plaintiff's expert Ray which will come in for more extended discussion later.)

Judge Bourquin refers to these changes and aptly and concisely describes the McMichael apparatus:

> "In the beginning McMichael's application was limited to 'improvements in apparatus for transporting granular and plastic building material, such as sand, plaster, mortar and concrete.'
>
> "Then, as now, the apparatus consisted of an upright cylindrical container, with hopper bottom terminating in a discharge pipe to the hopper connected by a U-bend. Two separately controlled air pipes connected with the container, one at the top, the other near the bottom and pointing downward. The specification in description of function and operation stated that air 'under any desired pressure' admitted through the upper pipe and over the material, by its pressure would force the latter downward and through the discharge pipe; that as the material passed through the U-bend it would be more or less tightly packed, which would tend to 'hold the water and the granular material with which it is mixed intact, so that the tendency to blow the water out of the material is eliminated'; that 'to loosen the material at the lower end of the hopper, should the same become packed, I provide the additional air pipe to discharge air through the material.'
>
> "Of six claims, only one related to the lower air and is as follows: 'an air pipe to deliver air at the lower end of the hopper, substantially as described.' "

DILATORY TACTICS OF McMICHAEL.

Continuing Judge Bourquin said (R. 611):

> "McMichael's prosecution of the application was dilatory to the limit of time, once incurring forfeiture."

(R. 612):

> "In the course of these proceedings in McMichael (to which the comment in Greenwalt's case (D. C.) 3 Fed. (2) 660, is applicable), the invention is expanded to include method, as well as apparatus, and by exclusion is restricted to only concrete."

THE PURPOSE OR OBJECT OF McMICHAEL'S INVENTION.

McMichael's real idea (and the one constituting the theory on which his patent was allowed) was that he would dump into his hopper his "concrete-forming materials" in **unmixed condition,** and that these materials would be mixed and converted into concrete whilst the material, **with a proper amount of water from pipe 12,** was being mauled and turned over and treated **while passing through the delivery pipe.** His invention was as his title imports a "mixing" and "conveying" device.

McMichael, of course, contemplated a **wet flowable** concrete. He says (p. 1, line 64):

> "There is also a valve-controlled water supply-pipe 12 adapted to deliver water at the lower end of the hopper when desired."

(p. 1, line 98):

> "To provide the **required amount of moisture to serve as a lubricant** to start the material out of the hopper and also to aid its movement within the conveying-tube, water from the pipe 12 may be turned into the lower part of the hopper to mix with the material as it enters the conveying tube. This water introduced through the pipe 22 (12?) and mixed with the other materials gives **increased fluidity to the mass and permits it to be more readily handled.**"

Twelve of the 35 claims of the McMichael patent have to do with "the herein described method of treating and conveying a mass comprising rock, sand, cement and water in concrete-forming proportions".

This "mixing" idea is repugnant to any so-called "slug" action.

This idea is emphasized by reference to the Application as filed in 1907.

His object originally was expressed thus (p. 197 Book of Exhibits):

> "This invention relates to apparatus for **elevating and transporting granular and plastic building material, such as sand, plaster, mortar and concrete.** The invention has for its object to provide an apparatus for elevating and transporting material of the character mentioned in a more expeditious manner and with greater facility than is possible by the employ of ordinary methods."

EXPULSION OF THE MATERIALS IS BY THE TOP AIR.

> "In operation, the material to be elevated is deposited in the receiver through the opening therein, falling into and occupying the hopper as shown. The door for the opening in the receiver is then closed manually and the air turned into the receiver from the reservoir, the air in which may be maintained under any desired pressure. The instant the air is turned into the receiver the door for the closure will be firmly held in closed position by the air pressure. Owing to the pressure in the receiver the material in the hopper will be forced downward and directed into the conveying-tube, being carried along by the latter until it is finally discharged at 15."

The purpose of the U-bend was to form a trap to prevent the water from pipe 12 being blown out ahead of the loose solids.

> "Owing to the provision of the U-shaped bend in the conveying-tube immediately after leaving the hopper, the material will be more or less tightly packed as it is directed therethrough.
>
> "This feature of construction tends **to hold the water and the granular material** with which it is mixed intact, so that the **tendency to blow the water out of the material is eliminated.** To provide the required amount of moisture to serve as a lubricant to start the material out of the hopper and also to aid its movement within the conveying-tube, water from the pipe 12 may be turned into the lower part of the hopper to mix with the material as it enters the conveying-tube."

The function of the secondary air jet 11 was thus briefly disposed of:

> "To loosen the material at the lower end of the hopper should the same become packed, I provide the additional air-pipe adapted to discharge air through the material."

The original simple description of 78 lines was in due course (and through 8 years of unexplained delays in the Patent Office) expanded into a seven-column specification 5½ times its original length and embracing new matter apparently never within the concept of the inventor and his original solicitor.

Notice at the very outset the original concept of McMichael, viz.:

> "This invention relates to apparatus for elevating and transporting **granular** and plastic build-

ing material, such as **sand, plaster, mortar and concrete.**"

The "elevating and transporting" of "**concrete**" was a merely incidental object. As we read the specification and the object of "transporting **granular and plastic building material, such as sand, plaster, mortar,**" we have an idea of means as would fit any such air-lift apparatus as would be capable of elevating and transporting similar or kindred plastic materials, such as wet sand and rock in dredging and caisson work by the pneumatic method. Indeed the prior art was full of means and methods for the pneumatic elevating and transporting of granular plastic materials, such as "sand, plaster, mortar and concrete."

McMICHAEL'S ATTEMPT AT DIFFERENTIATION FROM THE PRIOR ART.

McMichael throughout (at least the first three or four years of prosecution of his case in the Patent Office) was seeking to differentiate his apparatus and method where he used air to **push** the material through his pipe, from devices operating by suction, vacuum or induction. For instance, in his argument of February 1, 1909, he argued:

> "It is not seen that any of the patents cited disclose an apparatus suitable for transporting and elevating granular and plastic building material such as concrete and mortar. Surely no device which operates by induction, a device in which the material to be transported is introduced into and carried along in a conductor pipe by a blast of air, could be employed for the purpose for which applicant's device is constructed."

Of course, it was mere supposition that these apparatuses would not work for conveying concrete or anything else within proper limits.

McMichael in his patent says (beginning line 42): that the apparatus is equally suited for handling stiff material **or for material containing an excess of water.**

He goes on to say (beginning line 113):

> "The delivery pipe itself becomes a mixing chamber wherein pneumatic mixing is effected or continued, and, **if this duct is of a size properly related to the other parts, and to sizes of the particles of the materials, the latter can be rapidly impelled through it without danger of clogging or choking.**"

This simply means that you proportion the size of your discharge pipe to the size and character of the material discharged! That is and was necessarily true of Canniff, McIlvrid, Larkin, Leake, Duckham and all the rest.

McMICHAEL RECOGNIZES PRIOR ART FOR ANALOGOUS USE.

McMichael says (page 4, beginning line 29):

> "I am aware that it has been heretofore proposed to employ pneumatic apparatus for conveying each of many materials from point to point. This apparatus has included mechanism for conveying materials like grain and also pneumatic mechanism for transporting materials of a readily flowing or **viscous consistency such as 'grout,' a** composition all of whose particles are minute and easily commingled."

And how does he distinguish his invention from this prior art? Simply by **making his discharge pipe large**

enough to act as a mixing chamber, for he says (beginning line 38):

> "The pneumatic propelling of these various materials has been effected through discharge pipes of relatively small diameter in which because of the fineness of the particles of material transported there was no danger of clogging, and **which were not intended to be used as mixing chambers for the material in transit.**"

Unless we recognize that the only novelty in McMichael is his **handling of initially unmixed materials and mixing them while in transit,** there was absolutely nothing left of McMichael after subtracting the prior art, and that prior art is only the art that he himself cites. When we add to that prior art the numerous instances of prior analogous use and prior patents for handling practically everything under the sun, including concrete, grout, molten sulphur, dredge spoil, sewage, sand and water, etc., it is difficult to see where McMichael made any contribution whatever to the sum of human knowledge.

Not only that, but it is shown that many of the conclusions asserted boldly by McMichael that certain of the prior art would not work for concrete are disproved and that it was only because the Patent Office Examiners thought that possibly he had contributed to the solution of a hitherto unsolved problem and so resolved the doubt in McMichael's favor that the presumption of novelty in favor of McMichael is very much reduced in importance. In other words, McMichael's theory was wrong not only concerning the operation and capabilities of the prior art but he was wrong on the way his own device would work out in practice.

McMICHAEL'S U-BEND 24 THE ONLY NOVEL FEATURE AND THAT IMPRACTICAL.

The record shows that when the bend or elbow 14 is put in, it renders the machine inoperative by reason of plugging. Nevertheless McMichael not only emphasizes this feature and the cone-bottom of this tank in his specification but makes them the subject-matter of certain of his claims.

In the paragraph beginning line 51, page 4, after calling attention to the shape of the vertical hopper 1, with its sloping bottom walls, he says (line 58):

> "This is a matter of great importance where pneumatic pressure is depended on to effect the discharge,"

because of the discovery (?) that the **sloping walls will allow the concrete-forming materials to slide always towards the discharge outlet!** Whereas in other mechanisms of the prior art, which he apparently recognizes, these hoppers are provided with **flat bottoms!** for he says (page 4, beginning line 72):

> "And in this respect the mechanism is contra-distinguished from those in which discharge pipes are connected with relatively flat wall parts of materials containing receptacles."

It seems preposterous that this man or his attorney could even have thought that there was any invention in making the feed hopper of McMichael sloping rather than flat. This much is clear: that in this recognition of pneumatic grout machines prior to his invention, provided with hoppers with flat bottoms, (Canniff had smooth "sloping walls") he was cognizant of probably more than he has fully disclosed

and whatever invention, if any, he had, hung by a slender thread.

When we see the juggling that went on in the Patent Office between the McMichael application, the Leake application and the abandoned divisional application of McMichael, all under common ownership and single control, and the subsequent license under the Buzzell and Larkin patents, the Court should view with caution plaintiff's change of position from what it was when the McMichael application was pending in the Patent Office.

LEAKE AND DARLEY INTERFERENCES.

On May 18, 1909, a formal Interference was declared between the application of McMichael for his "Method of and Apparatus for Transporting Granular and Plastic Building Material" and an application for "Apparatus for Handling Ashes and other Materials" filed by Wm. W. Darly, of Pittsburgh, Pennsylvania, and also an application for "Cement Mixing and Distributing System" filed by Thos. S. Leake, of St. Louis.

The claims in issue in those Interferences conclusively **show possession of the same idea by the earlier inventor Leake** and also show that in the mind of the Patent Office Examiner there was **no difference in principle in conveying concrete** from conveying **dry granular material like coal and ashes** as exemplified in the *Darley* application.

LEAKE'S PRELIMINARY STATEMENT SHOWED PRIORITY OVER McMICHAEL.

Upon the declaration of the Interference, Leake, McMichael and Darley, in accordance with established practice, each filed an affidavit known as a "Preliminary Statement", setting forth the respective dates of conception of the invention, reduction to practice, etc.*

At great trouble and expense to defendant, Mr. Leake was located and his deposition taken. (R. 578-609.)

Mr. Leake is now a resident of Chicago, Illinois, and a respected, substantial citizen of the community. While he was naturally loathe to testify against his assignee he was evidently truthful and thoroughly honest. He gives convincing evidence on operation of his machine as early as 1905 in New Orleans,

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*Section 4904 of the Revised Statutes (Comp. St. 1913, Section 9449) provides that:

> Whenever an application is made for a patent which, in the opinion of the Commissioner, would interfere with any pending application, or with any unexpired patent, he shall give notice thereof to the applicants, or applicant and patentee, as the case may be, and shall direct the primary examiner to proceed to determine the question of priority of invention.

The Patent Office Rules accordingly provide *inter alia:*

> Rule 93. An interference is a proceeding instituted for the purpose of determining the question of priority of invention between two or more parties claiming substantially the same patentable invention. * * *
>
> Rule 94. Interferences will be declared between applications by different parties for patent or for reissue when such applications contain claims for substantially the same invention which are allowable in the application of each party. * * *
>
> Rule 110. Each party to the interference will be required to file a concise **preliminary statement**, under oath, on or before a date to be fixed by the office, showing the following facts:
>
> (a) The date of original conception of the invention set forth in the declaration of interference.
>
> (b) The date upon which the first drawing of the invention and the date upon which the first written description of the invention were made.
>
> (c) The date upon which the invention was first disclosed to others.
>
> (d) The date of the reduction to practice of the invention.
>
> (e) A statement showing the extent of use of the invention.

Louisiana, in the construction of the Stuyvesant Docks.

Leake (R. 582) identifies his sworn Preliminary Statement (a copy of which appears at R. 582) and testifies that the facts therein stated are true.

Leake's Preliminary Statement, as far as dates were concerned, was the same in both the Leake and Darley Interferences.

Leake's dates were:

Conception: February, 1905.

First drawings: March, 1905.

First disclosure: March, 1905.

First full sized machine: September, 1905.

Reduction to practice in the City of New Orleans, September, 1905.

The Leake Interference terminated without the taking of testimony, by **McMichael buying off Leake** for $6000. (Leake assignment, Defendant's Exhibit 136, pp. 474-9 Book of Exhibits) and the latter conceding priority, **despite the fact that he was the prior inventor over McMichael.** Darley, the junior party, was dismissed from the Interference simply because his preliminary statement showed he did not conceive his invention until after McMichael filed his application.

LEAKE, NOT McMICHAEL, THE PRIOR INVENTOR.

The reasons for McMichael buying out Leake after the Interference was declared by the Patent Office are not far to seek. They are found in the Leake

File Wrapper, which is in evidence as Defendants' Exhibit 135, and in the deposition of Mr. Leake (R. 578-609) taken at Chicago on behalf of defendants.

LEAKE PATENT NO. 1,215,558, DATED FEBRUARY 13, 1917, CONCRETE MIXING AND DISTRIBUTING SYSTEMS (APPLICATION FILED OCTOBER 7, 1907), ASSIGNED TO PLAINTIFF.

There is no question but that as pointed out by Judge Bourquin, supra, this Leake device (see enlargement) is for the same invention and purpose as McMichael. This is indicated by its title and by the specification and claims and by the Interference in the Patent Office between the McMichael and Leake pending applications.

The Interference was not decided on the merits of priority nor based on any concession of priority by Leake. Leake, although in his preliminary statement, carried his date of invention back of McMichael, and his present testimony shows that **he was earlier than McMichael,** simply took no testimony because he had sold out to the plaintiff. Having disposed of his interest in the application, patent and invention, Leake had no further reason for following up his application. For reasons best known to itself, plaintiff did not desire to disturb the record priority as it stood in favor of McMichael.

The Leake application was allowed, and then permitted to lapse for failure to pay the final government fee within six months from June 24, 1914, just as was done with the McMichael application.

It was renewed on the **last day of the two years** allowed by law, to wit, on June 24, 1916. (Paper No. 35.) It was thereupon reallowed on July 12, 1916, but again the plaintiff delayed until the last minute; the final fee being paid January 12, 1917, or the last day of the six months allowed by law. The patent issued, therefore, on February 13, 1917.

This Leake application, owned and engineered by the plaintiff, further illustrates a studious system of delay and inexcusable laches.

The four claims of the Interference are substantially claims 1 to 4, inclusive, of the patent as issued.

LEAKE'S TESTIMONY SQUARES WITH HIS EARLY PRELIMINARY SWORN STATEMENT MADE IN 1909 IN HIS INTERFERENCE WITH McMICHAEL.

Despite Leake's reluctance to testify, due to his loyalty to his assignee, the plaintiff, nevertheless he went on to verify the foregoing facts and to show, as follows:

(1) Reduction to practice in 1905 (R. 586-7).

(2) That Leake copied his idea from the air lift (R. 588-9).

(3) That the Leake device of 1905 was quite similar to McMichael is seen by the drawing (Exh. Book R. 694) which he made at the time of his deposition (R. 590-1).

(4) That the discharge in the Leake device was continuous (R. 591, 596-7-8-9, 601-2), thereby refuting the slug theory of McMichael.

(5) That the Leake device used wet concrete (R. 606).

(6) That the cement acted as a lubricant (R. 608).

ACTUAL REDUCTION TO PRACTICE BY LEAKE IN 1905 AS AGAINST CONSTRUCTIVE REDUCTION TO PRACTICE BY McMICHAEL IN 1907.

(1) Leake reduced his invention to practice in 1905.

(2) Against that, McMichael did nothing except file his application in January, 1907, until along in 1909 and after he had heard of the activities of Leake.

(3) Filing an application without any previous showing of inventive work, is termed merely a "constructive" reduction to practice. (*Automatic v. Pneumatic Co.*, 166 Fed. 288.)

(4) **Having made his invention and reduced it to practice in the fall of 1905, Leake had a vested right in the invention and could wait not to exceed two years before he applied for his patent.** (U. S. R. S. 4886.)

(5) If Leake failed to apply for his patent within the two years' period, he merely abandoned his right to a valid patent and what he did in 1905 would inure to the benefit of the public.

It has been aptly said that:

> "Reduction to practice is not merely a matter of construction, building and trial, but may consist in the disclosure of the idea by any kind of description, pictorial, verbal, or written, which will enable one skilled in the art to make and use

> that which is disclosed. We think a drawing may possibly be a sufficient reduction to practice, and an experimental machine insufficient, for the question is one of degree, and the ultimate test is always whether the inventor has shown operative means to that theoretically omnipresent person, the man skilled in the art." (Curtiss Aero & Motor Corp. v. Janin, 278 Fed. 454, 456.)

(In this connection it is to be remembered that Buzzell & Larkin made complete drawings of their invention—so clear that anyone can understand them —on **October 14, 1904** and in **December, 1906,** Exhibits 70-70a, and bound in volume with New York Exhibits. Buzzell & Larkin are entitled to a date at least as early as December, 1906.)

As to the criticism of Leake's testimony that the original machine was not introduced and there were no contemporaneous drawings, that is satisfactorily explained by the witness that the original machine was destroyed. He made no drawings except as finally went into his patent application.

Corroborating circumstances are found in the affidavit of Leake constituting his Preliminary Statement in the 1909 Interference proceedings and concerning facts that happened only a very few years prior thereto. Coupled with this is the promptness with which the plaintiff settled the Interference without taking testimony and paying Leake $6000.00. The cost of an Interference proceeding would be small indeed compared with the amount the plaintiff paid Leake; and if plaintiff had not been convinced that Leake could make good the dates of his Preliminary Statement and anticipate McMichael, it is quite cer-

tain that plaintiff would have gone on with the Interference and saved many thousands of dollars.

Leake's testimony today squares fully with his Preliminary Statement of 1909 and confirms the finding of Judge Bourquin that "despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence in quality and quantity inspires confidence and constrains conviction of the truth of the fact and beyond reasonable doubt."

The Circuit Court of Appeals carefully reviewed the Leake evidence, considered the relationship of Leake to the plaintiff and correctly concluded that as between Leake and McMichael, Leake was the first inventor.

On this branch of the case the Ninth Circuit Court of Appeals said (27 Fed. (2d) 838, 840):

> "The long period of inaction and silence on the part of McMichael, unexplained as it is, together with the payment to Leake of so large a sum of money as $6000, payable as it was in annual installments until March 1, 1920, is strongly suggestive of the inference that McMichael recognized the priority of Leake's invention and could furnish no proof to the contrary. As a witness for the appellee in the court below, Leake testified that he conceived the idea of moving concrete, as set forth in his application, about February 1, 1905; that he made a container in which to put the concrete, and by the means of an air pipe extending therefrom shot it up on top of a power house then being constructed in New Orleans; that, when the air pressure was applied, the concrete all went up and landed on there; that later he built a commercial apparatus in Chicago and operated it in conveying dry cinders to the fifth floor of a building. His testimony, together with his preliminary statement, carried the date of his invention back of that of McMichael and showed

an actual reduction to practice by Leake as early as 1905.

"We find no ground for disturbing the trial court's conclusion. The question at issue was which of two applicants for patent was the inventor. Both presented drawings and plans of the same invention. Leake furnished evidence of the time, place, and circumstances of the reduction of his invention to practice. There was no denial of the truth of his testimony."

None of this evidence in regard to Leake was, as far as we know, ever before the New York Courts.

THE LEAKE APPLICATION.*

Leake's patent application was filed for a "**Cement** mixing and Distributing System." It issued as a "**Concrete** Mixing and Distributing System." Query: what is the difference?

For the first few years of its prosecution and until attorney Bliss (solicitor for McMichael) came upon the field, it was known in the Patent Office as a "**Cement** Mixing and Distributing System." The suggestion to change "Cement" to "Concrete" in the title first appeared in the amendment of April 3, 1912 (Paper No. 28, p. 420 Book of Exhibits), with the request: "In the title as it appears on the file and in the preamble to the specification cancel 'Cement' and insert * * * Concrete * * * ."

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*This Leake application, owned by the plaintiff, further illustrates a studious system of delay and inexcusable laches. While the delay in the *McMichael* case was over eight years, the delay in the *Leake* case was nearly ten years. (For Leake File Wrapper see Defendants' Exhibit 135, pp. 331-470 Exhibit Book.)

The strange part about this otherwise insignificant change of the word "Cement" to "Concrete" in the title lies in the fact that one of the chief claims for originality with McMichael is that he was the first to convey concrete by compressed air, whereas, really Leake establishes as against McMichael, he was the first to convey **concrete** by compressed air as shown by the testimony!

The important question for this Court to decide is whether or not, when it comes to conveying any semi-liquid by compressed air, there is any substantial difference **in mode of operation while undergoing conveying** between concrete and any other cementitious, plastic or semi-liquid material. **The question is not whether cement, concrete and grout are synonymous, when considered in the building trades, but whether or not air acts on one differently from what it does on the other when this air is blowing through a pipe.** The obvious answer is that there is no difference whatever, or if there is any difference it is one of degree.

That McMichael and Leake had the same ideas in mind is seen from the original specification (page 3 of the File Wrapper Exhibit 135). Leake said:

> "The object of my invention is to provide a method and appartus for preparing a concrete mixture and delivering it while in a plastic condition to the place where it is to be utilized. Another object of my invention is to move plastic concrete from one place to another by means of air pressure."

In the enlargement of sheet 3 of the Leake patent drawings the Court will note the bottom slide valves

92-93 and how like they are to the slide or gate valve in the discharge pipe D of the Smith 1872 patent.

Leake's device was more practical than McMichael because **Leake intended to mix his ingredients in a chamber or receptacle 32** by mechanical stirring means 82-83 **(like McIlvrid, Exhibit 151, and New York Exhibits 98, 99, 100-a, 100-b and 101),** so that his concrete was really mixed and in a plastic condition before it entered into the delivery pipe 34.

McMichael, on the other hand, contemplated dumping all his dry materials into his receptacle and adding water as a lubricant and dilutent by the pipe 12; and then blowing it out by the combined air pressures through pipes 8 and 2, depending on the rolling action in the discharge pipe for mixing.

That Leake's idea was not to limit his machine to conveying concrete is seen by the character of his claims, particularly some of his original method claims. As seen by his original claim 19, (page 15 of the File Wrapper):

> "19. The method of conducting plastic material through a closed conduit, which consists in introducing the plastic material into said conduits, causing a difference of air pressure on opposite sides thereof in the conduit, and thereby moving the plastic material along the conduit in the direction of less air pressure."

Stated in simpler language, it merely means that he places his **plastic material** (mud, wet sand, grout, concrete, melted sulphur, etc.) in a conduit and applies sufficient air pressure on **one side** of the material to blow it through the pipe.

Leake's arguments in the Patent Office tend to substantiate the record priority dates of his preliminary Statement. Thus on February 10, 1908, (Paper No. 5, p. 367 Book of Exhibits) he says:

> "The applicant has done a large amount of experimental work in connection with this invention, and the particular embodiment thereof, which is disclosed in his application, is only one of many forms that it may assume. **He has successfully moved concrete** from the place where it is mixed to the place where it is to be used by means of air pressure, using the apparatus disclosed in this application." (Boldface type ours.)

On June 30, 1908, (Paper No. 9, p. 34 of the File Wrapper, p. 378 Book of Exhibits) it was said on Leake's behalf:

> "He has given considerable time and thought to this matter and has actually constructed several plants where this is done. Their operation is highly successful and appears to be a decided improvement over previously known methods for handling plastic concrete."

The Interference came along and plaintiff, through its attorney, a Mr. Bliss, bought Leake off for $6000 (p. 6). No testimony was taken. The Leake patent was held secretly in the Patent Office for ten years and not allowed to issue until after the McMichael patent.

Leake having gotten his price conceded priority to McMichael despite the true facts appearing above. The Interference was discontinued without the taking of any proofs or any adjudication by the Patent Office.

None of these facts, in fact none of the relations between the plaintiff and the several parties concerned, have ever before been brought to the attention of any Court prior to the present trial.

THE LAW OF NEW MATTER AND LACK OF SUPPLEMENTAL OATH.

Following the termination of the Interference favorable to McMichael, his application was passed to allowance February 23, 1910, apparently with the four claims in Interference. Instead, however, of paying the final fee and issuing the patent within six months and after more than three years of dilatory tactics the applicant waits until January 28, 1911, to petition to have the abandoned application revived and renewed. The specification is entirely revised and enlarged by a long amendment filed January 24, 1911. (Paper No. 13.) Not only was the original short and concise description considerably expanded in the light of developments since the application was filed in January, 1907, but there now appears in the patent as new matter practically all of the description beginning page 2, line 25, through to line 75, page 4. Such expansion of an ordinarily simple invention is almost unprecedented and is utterly unjustified by the law and the circumstances of the case particularly when, as here, this new matter was unsupported by a supplemental oath. Twenty-five new claims were added.

That our criticism of the method pursued by McMichael is not overdrawn is seen by the first action

of the Patent Office Examiner on February 18, 1911, in which he said, among other things:

> "The case as originally filed contained not so much as a suggestion of use of the cover 4 as a charge holder. How much of a charge relatively to the capacity of the receptacle could 4 hold? And the suggestion, now, that the upturned flanges of 4 may be extended upward is new specific construction. The matter should be removed from the case. Lines 14-22, page 2, go with the above.
>
> "Lines 1 and 5, page 2, of 'D' **'or otherwise'** is new matter. No means of closing 5 or holding it closed **'otherwise'** than by chain 3a is anywhere so much as hinted. Railway Co. v. Sayles, 15 O. G. 243 is interesting reading in this connection.
>
> * * * * * * *
>
> "Claims 1-5 are to matter not originally set up in any statement of invention or claim and not covered by the oath. Supplemental oath is necessary. That this matter was overlooked as to claims 1-4 in the former allowance, is no reason why it should be overlooked now. The same objection lies to claims 6, 8, 9, 10, 13, 17, 20. These claims also include the new matter above objected to, and are for that reason rejected."

One year and one day after February 18, 1911, (the date of the Examiner's rejection) to wit, on February 19, 1912, there was filed a fifteen page amendment adding a number of new claims, amending others and arguing at length for novelty based mainly on an alleged commercial installation of the McMichael structure.

Accompanying these claims was a new oath* by McMichael directed solely to the new claims that were

*Judge Bourquin pertinently commented on the suspicious circumstances surrounding the presence of this oath in the Patent Office record.

filed with this 1912 or second amendment and having no reference whatever to either the new matter added by the previous amendment of February 18, 1911, or the claims put in at that time and in no wise meeting the objections of the Examiner.

On March 30, 1912, the Examiner acted again, rejecting a large number of claims on the references already of record. To quote from this official action of March 30, 1912 (Paper No. 16):

> "While it is true, a patentee is entitled to all the functions and uses of his device, whether known to or contemplated by him, at the time of his disclosure, or not, and similarly an applicant, that does not warrant him in re-describing, to use terms signifying a specific structure not originally contemplated.
>
> * * * * * * *
>
> "The claims suggest no characteristics of the process, whereby the material loosened, thrown down and mixed by and just in advance of the jet 10, thereafter forms into a compact and piston-like mass forced forward by the aggregate pressure from 8 and 10. Perhaps it is the wet quality of the material that causes the difference of operation, of the device here and that expressed in the last paragraph, page 1 of Wallace.
>
> * * * * * * *
>
> "Claims reciting an old and known combination of elements are not rendered novel by merely their acting upon a different material."

Again the applicant delayed for nearly a year (less one day) or until March 29, 1913, when he filed a sixteen page so-called amendment, again expanding the application, cancelling some claims, revising others and adding a lot of new claims but without a supplemental oath.

In arguing for patentability over the references McMichael, by his attorney, on page 13 said:

> "For the proper operation of applicant's device it is necessary to secure a very high and sudden pressure in the chamber above the materials and this can be obtained only by providing 'means for preventing the flow of the air or materials out of the chamber except through the discharge duct.' In this way the entire energy of the air can be utilized in propelling the mass."

(This is an apt description of the operation of the dredging machines of Hussey and Duckham as well as the earlier concrete and grout guns of Smith, Canniff or McIlvrid.)

A supplemental amendment was filed April 15, 1913; and on May 12, 1913, the Examiner acted on the case, rejecting two of the claims on references; and **one year and two days later,** to-wit on May 14, 1914, an amendment was filed, cancelling the two rejected claims and emphasis being laid on the fact that in the McMichael device the **smoothness of the walls** and the angular disposition of the sides of the hopper were further emphasized. Thereafter the case was allowed as of July 11, 1914.

THE CLAIMS IN SUIT.

The McMichael claims in issue are 1, 2, 17, 18, 24, 29, 34, 35 and are typified by the following:

CLAIM 2: In combination,

(1.) a chamber for containing concrete forming materials [or analogous material],

(2.) a conduit leading therefrom,

(3.) a compressed air inlet pipe, connected to a part of the chamber remote from the conduit,

(4.) and another compressed air inlet pipe leading through the chamber wall and terminating within the chamber near the opening into the conduit in a nozzle directed toward said opening.

CLAIM 17: In a device for treating and moving a mass of concrete forming materials, the combination of

(1.) a chamber for receiving and containing the said mass,

(2.) a discharge duct connected with the chamber,

(3.) an air inlet pipe connected with the chamber,

(4.) means for preventing the flow of air or materials out of the chamber except through the discharge duct,

(5.) means for supplying air under pressure through the said pipe to the chamber back of the mass of materials therein to push the said mass toward and into the discharge duct, and

(6.) means for causing a jet of air to impinge upon successive portions of the mass in the general direction of the discharge duct to directly assist their movement therethrough.

CLAIM 24: In a device for treating and moving a mass of concrete-forming materials, the combination of

(1.) a chamber (1) adapted to receive and contain the said mass,

(2.) a discharge duct (14) connected with the chamber and extending from it to a discharge point in a horizontal plane above the chamber,

(3.) and means (pipe 10) for directing a pressure agent into the discharge duct in the general direction thereof to engage sub-masses of the materials and aid their movement through the duct to the discharge point.

THE McMICHAEL PATENT CONTAINS A MULTIPLICITY OF NEBULOUS CLAIMS CALCULATED TO DECEIVE.

What justification is there for the 35 claims of the McMichael patent? It recalls the warning of this Court in *Carlton v. Bokee*, 17 Wall. 463; 21 L. Ed. 517, 519:

> "If they mean anything more than the claim in the original patent they are void. Being identical with that they are needlessly multiplied, and by exhibiting a seeming of claims to which Reichmann was not entitled they are calculated to confuse and mislead. We think it proper to reiterate our disapprobation of these ingenious attempts to expand a simple invention of a distinct device into an all-embracing claim, calculated by its wide generalizations and ambiguous language to discourage further invention in the same department of industry and to cover antecedent inventions. Without deciding that a repetition of substantially the same claim in different words will vitiate a patent, we hold that where a specification by ambiguity and a needless multiplication of nebulous claims is calculated to deceive and mislead the public, the patent is void."

THE "SLUG" THEORY OF PLAINTIFF.

Plaintiff has throughout all the litigation sought to impress the Court that there is something mysterious and different in the conveying of concrete or cementitious mixtures by compressed air, from conveying other liquid or semi-liquid substances. There is nothing in the patent to support plaintiff's "slug" theory even if the theory was sound, which it is not.

In the prior litigation, much will be found concerning this alleged "slug action"; that is, alternate sections of concrete and air traveling through the discharge pipe; and this was said to be a novel operation invented by McMichael and necessary to the successful conveying of concrete by compressed air. It is plain, however, from a reading of the McMichael file wrapper, that the real reason why the Patent Examiner allowed the McMichael claims was because of a mistaken belief that concrete, for some reason or other not disclosed, was not to be considered in the same category with other mobile substances, such as sand, ashes, and other dry materials, which had been conveyed by compressed air, as shown in numerous prior patents cited by the Examiner. As is not unusual, the patent office failed to find or cite the best art so that whatever presumption attaches to the patent is lessened by just that much.

As time went on, and the practice of employing wet concrete grew, the difference between concrete and grout became largely a matter of terminology, and plaintiffs apparently feared to go before a Court and rely upon this slight distinction in the character of

the use to justify a patent. Some disguise was felt to be necessary; so the slug theory was advanced. Even then, plaintiffs were not original, since the slug or piston theory as applied to air lifts had long before been advanced by Pohle (post) and others.

THE "SLUG THEORY" THE ONLY INVENTION OF PLAINTIFF.

Plaintiff's last-minute strategy succeeded before the New York Court, and this "slug theory" of operation was adopted in its entirety, although it was at best a mere theory, shrouded in doubt. This is clearly shown by the opinion of Judge Augustus Hand when passing upon the same McMichael patent in the subsequent suit of *"Concrete Mixing & Conveying Co. v. Powers-Kennedy."* This same Judge had tried the *Uhlen* case, supra, and might be expected to express a definite opinion in a second trial dealing with the same patent, but found it necessary to resort to speculation on the question of "slug" action.

In the *Powers-Kennedy* case he said:

> "I do not regard it as **theoretically probable** that masses of concrete containing gravel stones of a diameter running to 1¼ inches can be blown long distances by compressed air, and I think the testimony of Mr. Ray (plaintiff's expert) that he could detect the passage of a series of slugs when he put his ear to the outlet pipe, is the **more probable** testimony."

Apparently, Judge Hand was misled by the testimony before him, for it is a fact capable of ready demonstration that rocks as large as **15 inches in**

diameter have for many years prior to McMichael's time been conveyed long distances through pipes by means of compressed air, in connection with dredging and excavating operations. (See Miami uses, post.)

Thus, after two trials before the same Judge, the McMichael patent appears to have been upheld on purely speculative theories which would have to give way when the real facts were shown.

PLAINTIFF'S SO-CALLED "SLUG" THEORY EVEN IF POSSESSING FOUNDATION IN FACT IS DISCLOSED IN THE PRIOR ART.

This slug theory was so insistently and insidiously urged upon the Court of the Ninth Circuit (as it was and successfully so upon the New York Courts in the previous litigation), that we shall digress a moment to refer to two earlier patents, and which patents, as far as we are advised, were never called to the attention of the Court in the *Uhlen* case.

POHLE PATENT NO. 487,639, DEC. 6, 1892.

(Defendant's Exhibit 152, Ex. Book, p. 565.)

PROCESS OF ELEVATING LIQUIDS.

The "slug" or "piston" idea is dominant throughout the Pohle specification and claims as well as the other literature on the subject of the "Pohle Air Lift."

The patentee says:

> "The invention relates to the art of elevating water by compressed air; and it consists in im-

proved processes and apparatus whereby the compressed air is delivered in bulk into the lower end of the water-eduction pipe and the water and air are caused to ascend through said pipe **in distinct alternate layers of definite dimensions.**" (P. 1, line 8.)

And again he says:

"In accordance with my invention the air is not directed into the water in the form of fine jets or bubbles, which would very readily commingle intimately with the water, but **is delivered in mass and the water and air ascend in well-defined alternate layers throughout the eduction-pipe.**" (P. 1, line 23.)

SAUNDERS PATENT NO. 597,023, DATED JANUARY 11, 1898.
(Defendant's Exhibit 153, Exh. Book, p. 571.)

Mr. Saunders was the founder and editor of the publication "Compressed Air" (Exhibit 172) and is the author of the book, "Compressed Air Information." (Defendant's Exhibit 172 for identification.)

He describes in his patent his improvement on Pohle as follows:

"In accordance with my invention the compressed air is not directed into the water in the form of fine streams or jets which would readily commingle therewith, nor is it delivered continuously at the foot of the eduction-pipe, thereby, as asserted by some, **dividing the water into piston-like layers** the existence of which is doubted, nor is either the air or the water started on its upward journey through the eduction or delivery pipe in a continuous stream; but by means of the arrangement of apparatus and the proper regulation of the pressure of the liquid and the gas employed it is so arranged **that**

masses of the liquid and masses of the gas are started up the delivery-pipe in alternation and each with a high velocity, as will appear." (P. 1, line 25.)

Thus Saunders combined with the "ejector" method of Pohle and of McMichael but the added **pressure on top**, of McMichael, all as seen in the drawings and fully described in the specification.

If the McMichael device does work on the "slug" or piston theory the attempt to differentiate it from the prior art fails utterly. On the other hand, it is conclusively shown that the Hackley gun of defendants, does not have any so-called "slug" or piston action but that the **discharge of the concrete is in a continuous, even, steady flow.**

NON-INFRINGEMENT.

Judged by plaintiff's own standards, the machine of defendants does not operate on the same principle as McMichael and, therefore, there is no infringement.

In the *Storrie* case plaintiff unfolded its "slug" theory through the medium of its professional patent expert, Mr. Ray.

To offset Mr. Ray's ingenious theory what had so hoodwinked the New York Court, it was incumbent upon Storrie & Company to show what the true facts were governing the "mode of operation" of the McMichael patent. It was with that end in view that the Western defendant prepared along the following lines:

(1) Exhaustive scientific and practical tests to determine what action actually takes place in the discharge pipe of a compressed air device for conveying concrete or grout, particularly defendant's device.

Accordingly here, with the most accurate and reliable measuring instruments known to science eminent engineers and scientists were set to work to determine the presence or absence of any so-called slug-action in defendant's apparatus. The results of these tests and observations will be found in the testimony of Messrs. Wilkins and Peterson, and analyzed post.

(2) A showing of the common knowledge which existed prior to McMichael's time relative to the presence of a "slug" or pulsating action in air-lift devices used for pumping water, sulphur, mud, sand, etc.

(3) A full showing of prior uses, patents, and publications dealing with the conveying of concrete by compressed air, and of other materials closely resembling concrete and containing rocks of large size.

Depositions were taken in Louisiana, Florida, New York, and elsewhere, which included fact testimony of many witnesses who, long prior to 1907, had employed compressed air for conveying or lifting molten sulphur, a very difficult substance to handle; had used it in large dredging and excavating operations, and were well acquainted with the capability of compressed air to convey mud and "spoil" containing rocks and other solids as large as 15 inches in

diameter and weighing up to thirteen hundred pounds, through pipes over a long distance.

So overwhelming was the evidence offered here by defendant in contradiction of plaintiff's makeshift theory of the presence of a "slug" action, that the trial Court found:

> **"To expect to secure movement of the concrete in alternate slugs of concrete and air would do violence to the laws of Nature and confound reason. It can not be done."**

And again says Judge Bourquin (R. 618):

> **"As between Wilkins' test discrediting the slug theory and Ray's supporting it, the former's is calculated to more nearly approach accuracy."**

The above are **findings of fact** by the trial Court, which this Court in several cases has said should be regarded as unassailable upon appeal. (*Adamson v. Gilliland,* 242 U. S. 350; 61 L. Ed. 356; *Butte Superior Co. v. Clark,* 249 U. S. 12.) The fallacy of plaintiff's theory strikes at the very foundation of plaintiff's case as presented not only in this instance but also in the prior suits in New York. It was because of a failure on the part of the defendants in the New York trials to set the Court right that there resulted the erroneous findings of validity of the McMichael patent.

PATENTS ARE NOT GRANTED FOR A "THEORY."

The former New York suits each went off on the false theory that the **movement of concrete** by compressed air involved a different principle or law

of physics from the movement of other substances by the same medium.

Judge Hand (12 Fed. (2d) 929), adopting the rather plausible but artificial and specious distinction, conceived by plaintiff's expert Ray to fit an emergency, between the movements of concrete and of ashes, sand or water, and found that concrete was not conveyed by the air as mass or float on the air, but **propelled in short slugs*** by air pressure behind each slug.

Judge Hand sought to contrast the movement of concrete, according to his understanding, with the operation of the well-known sand-blast and of pneumatic conveyors used in conveying grain, ashes, coal, etc., by adopting the theory of plaintiff's expert Ray that the action there was a so-called "kinetic"† action or **floating** of the articles by the air stream.

It is obvious that the term "kinetic," when considered in the light of its accepted meaning, is misapplied by the learned Judge.

Aside from the artificiality of this theoretical distinction over the prior art and however meritoriously it may have appealed to Judge Hand on the records before him, the present evidence shows that on which-

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*Apparently Judge Hand was of the opinion that concrete followed the principle of the penumatic dispatch tubes and containers for carrying coin boxes, sales-slips, etc., in common use in department stores, etc.

†"kinetics: The branch of dynamics that treats of the production or modification of motion in bodies; opposed to statics. Compare dynamics.

"kinetic: (1) Producing motion; motor. (2) Consisting in or depending upon motion; active; opposed to latent or potential; as, kinetic energy. Kinetic energy, see energy. (4)-k. theory, any theory of the constituent of bodies which explains their properties by the motion of their particles, especially that theory of gases according to which their elasticity is due to the rapid motion of their molecules, which dart about in straight lines with an average velocity that increases with the temperature until deflected by encounters with one another or with the walls of the containing vessel." (*Standard Dictionary.*)

ever or whatever theory plaintiff here seeks to proceed, there is nothing new in theory or practice.

Moreover, we believe that here the professional expert Ray is entirely discredited, and that if he believes what he testified to, he does not know what he is talking about.

FALLACY OF THE SO-CALLED "SLUG" THEORY OF PLAINTIFF.

In the first place patents are not granted for theories. Just why plaintiff lugged it in we do not know except as we pointed out earlier in this brief as a camouflage to otherwise patent invalidity.

The only sponsor for the slug idea is Mr. Ray, the professional patent expert. His lack of qualification to speak on the subject is apparent, however capable he may be in some other lines.

Not a single practical man knowing anything about the use of these apparatuses was brought forward by plaintiff even to suggest the idea that concrete was conveyed any differently than anything else by compressed air.

Concrete flows by gravity like other mobile substances. Also, it is blown by air like other mobile substances.

This Court is too well informed on the general laws governing the flow of liquid, gases and other mobile substances to be more than reminded that there is such a thing as air slippage, and skin friction of the material in a pipe. If the friction is too great and

the air cannot slip by, the apparatus will plug up. The skin friction of a compacted mass impervious to air is enormous.

Any so-called "slugs" of such dimensions as Ray mentions (R. 143-145) would result in instant stoppage.

In any event a slug is a plug; a plug is a stoppage; a stoppage is a shut-down; and it takes very few shut-downs to make a failure.

Compressed air under 100 lbs. pressure when released does not wait for any roll-call of slugs. It tears into the mass at high velocity and seeks outlet along lines of least resistance. A tornado in concentrated form turned loose would represent about the degree of orderliness that occurs in the mass in the discharge pipe. The little movie pictures in evidence as exhibits showing the blowing effect of water, grout and concrete, represents what takes place, to discredit the theory of the plaintiff. These pictures are proof positive to the effect that the action is the same whether water, grout or concrete is being expelled by air pressure.

THE PLAINTIFF'S TESTS BY RAY PROVE NOTHING PERTINENT.

The plaintiff's alleged tests prove nothing of any value, nor anything pertinent to the issues, in this case.

Plaintiff's concealment of its tests on *prima facie* when seeking to lay a basis for its theory, served only to emphasize their own lack of faith in their theory.

They paraded it before the Court on rebuttal simply because of the refutation of the theory by the overwhelming proof positive furnished by Mr. Wilkins; and the further testimony of every practical man in this field, that the concrete flowed out of a Hackley gun in an **even continuous flow!**

Even their own and only practical witness, Brock, surprised them when he testified (R. 134):

"A. In placing the floors the gun was not used, no.

Q. Did you ever hear the concrete coming out of the gun at the discharge end?

A. I did.

Q. How did it come out?

A. It came out through the eight-inch pipe, through an apron and the concrete—a concrete strip on both sides.

Q. **It flowed down gently like over both sides?**

A. **Yes, sir.**"

(R. 135):

"The COURT. You worked both without and with the gun?

A. The tunnels with the gun and the floor without the gun."

THE PLAINTIFF'S TESTS BY RAY PROVE NOTHING PERTINENT.

Ray does not set out to make a fair test in the first place. He performs his tests secretly in a laboratory in Chicago. They are not done under even a semblance of working conditions. He says he used rock up to **4 inches** in diameter. He does not use an instrument which is capable of recording either **flow** or **nature of the material** supposed to be under observation.

He places his instrument at a considerable distance from the gun and practically at the end of the discharge pipe. He uses an **elbow** so that the material will be suddenly intercepted and deflected.

The method used by Mr. Ray measures **impact** and **not flow.** It could measure pressure only if on the **side** of a straight pipe. There is no way to convert such data to **flow,** unless both the **velocity** and **nature** (that is, weight) of the moving mass is known.

The data to apply to practice must be taken under substantially operating conditions. This Ray carefully avoided.

The rocks in the concrete traveling at 100 feet or less per second and striking the pad on the elbow would cause **impact** to be recorded. The rubber pad also reduces the size of the discharge line and in combination with the elbow would restrict the discharge and might cause an intermittent flow. The density of the mass is not the same at all points in the concrete discharge and when this mass is traveling at a high velocity would cause a varying impact on the outer side of the sharp elbow.

Ray himself admitted on cross-examination the interruption in flow due to the elbow.

THE HACKLEY MACHINE DOES NOT WORK ON THE SLUG PRINCIPLE.

Plaintiff's witness, Brock, has already been quoted showing that on the Skagit job, the alleged infringing machine delivered the concrete to **flow down gently** and not in any explosive slug manner.

Misunderstanding of plaintiff's counsel of how concrete is delivered by these machines:

At pages 9-12 of plaintiff's brief there is an extended argument to the effect that in the McMichael apparatus the concrete is discharged explosively (as a siege gun firing great slugs of concrete) with such **momentum** (italics theirs) that the concrete is automatically packed. This in the face of all evidence to the contrary and particularly of their witness Brock above quoted as to the **"gentle flow"** of the concrete from the Hackley gun! It is a sample of ignorance of operation displayed throughout the brief. **"Momentum" and "velocity"** at the point of delivery are exactly what the engineers who know anything about this work say **must be avoided,** as otherwise the wooden forms will be knocked down or displaced under such a bombardment and a **separation** of the concrete-forming materials would take place rather than a setting of the concrete properly.

Mr. Hackley tells us (R. 424) that the practice in discharging the concrete into the forms is "to control the discharge and make the discharge **as slow as possible;"** that the purpose of that is to **prevent separation** of the concrete and to prevent also less wear on the pipe; that the flow is **"by gravity"**; and that this flow is "in a **steady stream.**" (R. 425.)

THE PROOF OF THE PUDDING.

In discussing this so-called slug formation and action Mr. Hackley, the practical engineer, says of the impracticability of plaintiff's theory (R. 422-3):

"Q. Have you ever seen a gun of the type or character or design of this McMichael drawing that had a U-bend?

A. No, I have not.

Q. What, from your knowledge as an engineer and your experience in handling concrete materials would be **the effect of the interposition of the U-bend in the outlet of a concrete gun?**

A. **It would form a trap that would prevent the concrete from leaving the gun.**

Q. And the result would be what?

A. A plug.

Q. And when you get a plug, what happens?

A. There is no movement of the concrete or discharge.

Q. What do you do then?

A. **If it is a serious plug you have either to disconnect the pipe or take the concrete out of the pipe.** You cannot do it by hammering on the pipe.

Q. How did the concrete come out of that gun that was condemned—that so-called McMichael gun? Did it come out in a continuous flow or by a so-called flood (slug) action, such as this expert, plaintiff's expert Mr. Ray has described as in his opinion exists?

A. Came out in a **continuous stream.**

Q. What would be the effect in your experience of a so-called plug action or the cause of a so-called plug action?

A. **If a slug does form in the pipe it will form a plug and stop the action entirely.** In order to have the concrete continue to go through in the pipe, the air has got to go through with it. As soon as the air is stopped the flow stops entirely.

Q. Now, in a machine according to your patent shown on Exhibit 180 before you, or the drawings of your patent Exhibit 180, and the machine used on the Skagit job, claimed here to infringe, how did the material issue from the discharge pipe?

A. **In a continuous stream,** mixed with the air."

Hackley further testifies that this discharge was as slow as possible to prevent separation of the concrete and also to prevent excessive wear on the pipe. His experience was the **same with using a Hackley gun for shooting either concrete or grout.** In each case the material issued in a steady stream. (R. 425.) That was likewise the action with the Smith and Canniff devices used in the San Francisco tests.

Mr. Wilkins, speaking from his experience, says (R. 446):

> "A. The general conclusions were that the concrete flowed through the pipe with a proper supply of air, **practically a uniform mixture of air and concrete, somewhat denser at the bottom.** That if the air pressure dropped, you could make it vary somewhat. However, **it was still a mixture of air and concrete.**
>
> Q. Did you ever encounter any slugs or plugs such as Mr. Ray, plaintiff's expert, has referred to?
>
> A. There were not.
>
> The COURT. Do you mean that this was a continuous flow of the mixture. I want to know if this was a continuous flow of this mixture.
>
> Mr. TOWNSEND. The Court desires to know if this was a continuous flow of the concrete material through the pipe, or was it separated?
>
> A. This particular record so indicates.
>
> Q. Indicates what?
>
> A. **That it was a continuous flow of the mixture of air and concrete.**
>
> Q. And did you observe the concrete flowing or issuing from the discharge pipe?
>
> A. I did.
>
> Q. And how did that correspond in appearance with your scientific record here?
>
> A. **It corresponds to my mind exactly in that it flows out of the end of the pipe much the same**

as the discharge from a deep well turbine pump, I would say.

The COURT. Well, how is that?

The WITNESS. **It has a uniform flow without any spurts or dumps and not necessarily solid."**

Mr. Peterson, another practical engineer, speaking from experience says (R. 458-9):

"The WITNESS. I have observed the operation at Maloneys that Mr. Wilkins testified to.

Q. You did?

A. Yes, sir.

Q. And what were the working conditions under which this test was made?

A. The regular working conditions of placing concrete in the tunnel.

Q. How was the concrete coming out of the pipe? In a continuous flow, or otherwise?

A. **In a continuous flow.**

* * * * * * *

Q. What have you to say as to the theory of Mr. Ray that the concrete in the Hackley gun travels through the pipe in the form of slugs?

A. **It has been my observation that the concrete comes through in a uniform flow of the concrete and compressed air.**

Q. What would be the result of a so-called **slug-action** referred to by Mr. Ray?

A. **It would plug the pipes.**

Q. And what does that do?

A. **That stops the works and it is necessary to take the pipes apart and get out the concrete."**

PLAINTIFF'S IMPACT DEVICE WITH GAUGES IMPRACTICAL.

The Ray's impact contraption is utterly useless as a device for measuring either flow or nature of flow is further shown by his reference to the use of mechanical **gauges** along the discharge pipe. Not only are

gauges **too slow** for registering **variations** in travel of fast moving objects, but a gauge would instantly clog with cement and cease to function. As the Court knows a pressure gauge must have its recording mechanism in communication with the fluid whose pressure is to be recorded. This communication is a small pipe or passage which, of course, would quickly become clogged with cement and sand.

The ridiculousness of such means for the uses here proposed, is indicated by Hackley who says (R. 431):

> "A. If the statement was made that the gauges were put on the discharge pipe, they would not act. They would fill with concrete right away."

Wilkins says the reason he did not try gauges was (R. 445):

> "For two reasons. First, the gauges are unsatisfactory and not fast enough to detect the changes that we desired measured and, second, because any pressure readings taken by a gauge only indicate the pressure at that point and not the nature of the flow."

PLAINTIFF'S MISLEADING AND DECEPTIVE CHARTS.

Plaintiff, in an effort to reconcile the Wilkins tests on behalf of defendant and the so-called Ray tests on behalf of plaintiff, resorts to extreme measures in distorting charts and diagrams, falsifying records and misrepresenting testimony. That is harsh language and can only be justified by showing it to be a fact.

Plaintiff accepts the Wilkins method as scientific and practical. It disputes the conclusions shown by

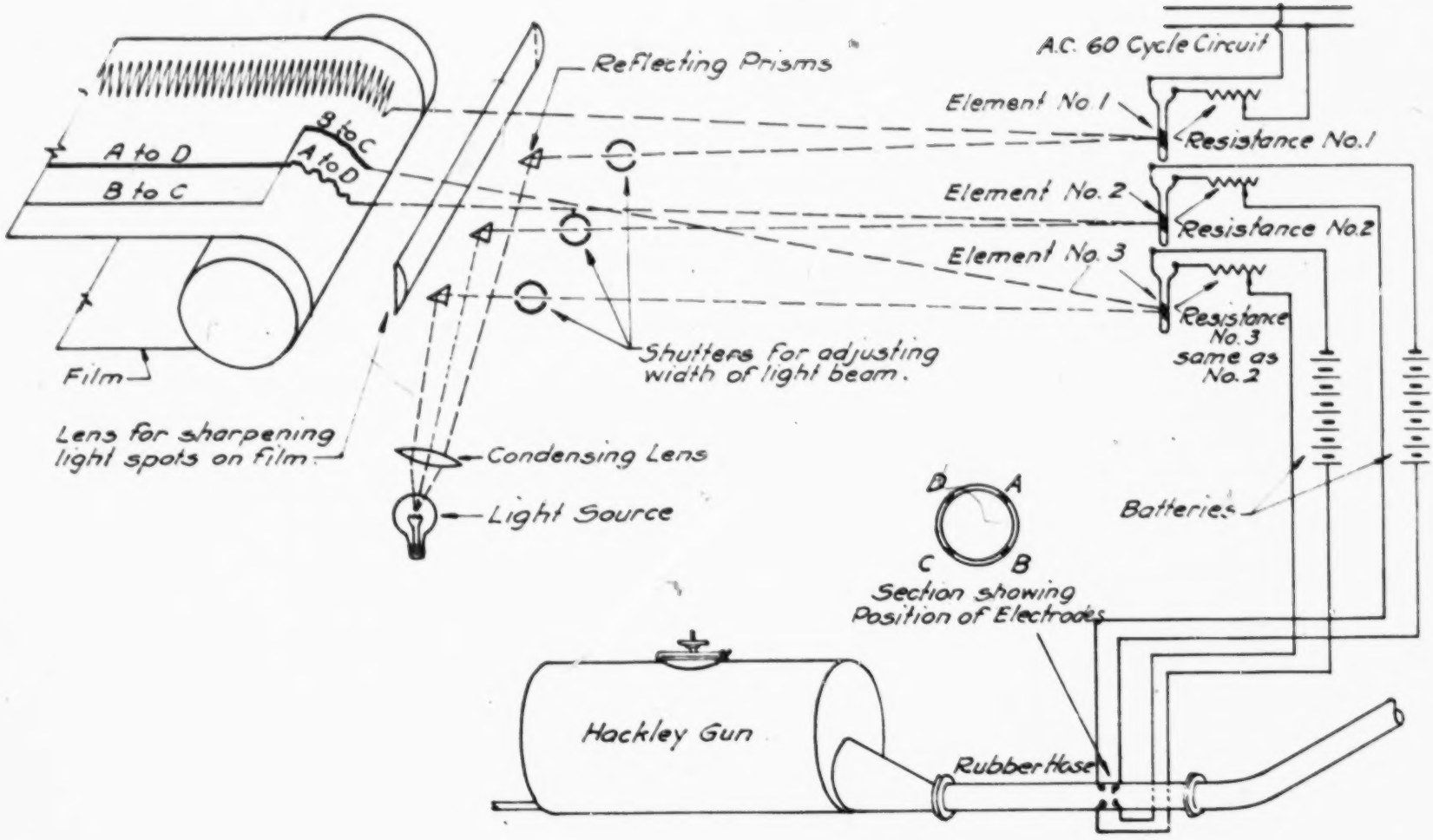


Diagram of Oscillograph and its Connections to the Discharge Pipe of Hackley Gun.
Used to Obtain Exhibit No. 189.

the Wilkins records. But in doing so plaintiff shows either an ignorance of the machine with which it pretends acquaintance, or deliberately misrepresents the facts.

Opposite page 78 of its brief plaintiff presents a chart designated as "Plate Two" which plaintiff tries to pass off as a "diagrammatic showing" of defendant's oscillograph used in making the Wilkins test.

Plaintiff's drawing is not correct. It has been distorted so that the lines B-C and A-D are parallel rather than crossed as they should be, and the upper line A-D is made heavy throughout its length and the line B-C is made thin throughout its length. Those changes, simple though they seem, are contrary to what actually is the case, and such changes being deliberate would, if accepted, result in the deception of the Court.

Opposite defendant has reproduced a correct diagram, showing schematically the mechanism and operation of the Wilkins machine exactly as said drawing appeared in defendant's briefs in the Courts below. A comparison of this diagram with plaintiff's "Plate Two" will at once show the existing differences to which attention is directed.

By way of preface it is to be noted that Mr. Wilkins is a scientist of distinction in this field of research and test work.

Perhaps it would be helpful to quote here first just what he says he did in connection with his tests on a standard Hackley apparatus under every-day working conditions.

He says (R. 443):

"* * * to find out what the nature of the flow of concrete was from a Hackley gun, followed the procedure used in testing the speed of projectiles from large caliber guns, that is, two contacts are made which the projectile will short as it passes them. The current is applied through the circuit which passes through this with an element of an oscillograph, which is a sensitive ammeter leaving a record on a moving film. For the concrete he used a rubber hose six inches in diameter, the same size as the concrete ejection pipe and put in the rubber hose iron electrodes which came flush with the inside of the hose. These were connected with a battery and the oscillograph element in series and a record was taken of the current as the concrete was shot through. Mr. Wilkins stated that if the pipe is full, the concrete as it goes out will give a record on the film. **If the pipe is empty it gives no record at all. If the concrete went out in plugs or slugs, it would give a hump and then drop back to zero** and then drop back and give another hump as each went by. As concrete is mixed with air it gives a deflection that is not as great part way up. If it is perfectly uniform it gives a perfectly uniform straight line. If it is broken up or the concrete changes—the mixture of the concrete and the air changes—it gives a wavy line. From these tests you can determine the exact nature of the flow and about its speed."

THE WILKINS TESTS.

In order to study distribution across a section of discharge conduit, a section of rubber hose as an electrical insulation was interposed in the discharge line about 20 feet from the gun and under regular everyday working conditions with a Hackley gun, such as charged here to infringe and with the **same consis-**

tency of concrete mix as used on the Skagit job. (Hackley R. 427.) Four electrodes were placed equally around the circumference of the hose at each of two sections.

With one oscillograph element on the pair of electrodes at the bottom and one on the pair at the top, an indication of the action for each part of that section was obtained, i. e., for the hose half full of concrete at the bottom and the remainder of the air at the top, a continuous current between the bottom electrodes would be recorded and no current would flow in the two top electrodes; the air being an insulator; concrete being a good conductor.

The current record indicates the time taken for a given volume of air and concrete to pass the electrodes. By virtue of a 60 cycle wave of alternating current simultaneously recorded on the same film, this time was determined.

The tape or oscillogram (Exhibit No. 189 represents practical operating conditions for twenty seconds, with concrete traveling at the rate of 20 feet per second. If there had been any "slugs" of even one foot or less in length, and separated as Ray believed by insulating air bodies, there would have been at least 200 alternating abrupt hills and dales showing on the tape! On the contrary, the concrete body is substantially **uniform and continuous** with air slipping over the top; disproving utterly the Ray fancy.

While our drawing with its legends is largely self-explanatory, a few words further may be helpful concerning its operation.

The oscillograph is essentially an ammeter, or an instrument for measuring the flow of a current of electricity, arranged to indicate accurately currents which may change in amount with great rapidity.

This drawing shows the essential parts of the oscillograph used for the production of Exhibit No. 189 with its connections to the electrodes in the discharge pipe of the Hackley gun.

Three similar elements were employed, marked No. 1, No. 2, No. 3; each consisting of a loop of very fine wire mounted in a strong magnetic field produced by magnets which are not shown.

Electrical current passing through a loop in one direction causes that loop to rotate clockwise. Current passing through the same loop in the reverse direction causes that loop to rotate counter-clockwise. An alternating current causes the loop to oscillate. At any instant of time the amount of rotative movement of a loop is exactly proportional to the current passing through the loop.

Rotative movement of a loop is indicated by a beam of light reflected from a tiny mirror which is attached to the two wires of the loop. The light reflected from the mirror is projected onto it by an optical system consisting of a source of light, a condensing lens, a prism for directing the light onto the mirror and a shutter for adjusting the width of the beam of light. The beam of light reflected from the mirror passes through a lens which sharpens the beam before it falls on the sensitized film. The film is moved at a

uniform rate to the left,—hence any varying deflection of the light beam will trace a wavy or irregular line on the film.

Element No. 1 was connected to a 60 cycle per second alternating current source through Resistance No. 1. This element recorded a 60 cycle wave on the film for the purpose of securing an accurate record of time.

Element No. 2 measures the current derived from a battery limited by Resistance No. 2 to a safe amount for the element and controlled by the resistance encountered between electrodes A and D. The deflection of the line A to D on the film from its base represents the reduction in resistance between electrodes A to D.

Similarly Element No. 3 measures the current derived from its battery, which is exactly the same as the battery of Element No. 2, limited by Resistance No. 3, which is exactly the same as Resistance No. 2, to a safe amount for the element and controlled by the resistance encountered between electrodes B and C. The deflection of the line B-C from its base represents the reduction in resistance between electrodes B to C.

It will be noticed on the film, Exhibit 189, that the deflected line B-C crosses over the line A-D near the beginning of the film. This is indicated on this chart, supra. **The comparatively great deflection of B-C is caused by a much larger reduction in resistance from B to C than from A to D, due to the arrival of much more concrete between B and C than between A and D.**

In other words, the mirror of Element No. 3 was rocked to the right so as to transfer the point of projection of its light beam from the position of the initial straight line B to C (indicating absence of concrete in the pipe) to the position of the upper wavy line B to C (indicating the aforesaid reduction in resistance due to the arrival of the concrete, the concrete being a relatively good conductor).

The varying widths of the lines traced are due to the adjustment of the **condensing lens and the shutters.** In other words, the widths of the base lines are determined by **focussing** devices and **not** by the **dimensions of the mirrors.** This statement is confirmed by Mr. Ray's testimony. (R. 543.)

Ray says:

> "Q. Can you tell your opinion, or state your opinion as to the reason, if any, why one of those lines is very much wider than the other?
> A. Why, it is apparently a **difference in the focusing** of the light beam."

(R. 544):

> "Q. Now, let me ask you to explain, if you can, why one line is apparently much wider than the other as drawn on those oscillographs?
> A. I should say it was merely a **question of the focusing of the light beam.** In the lower line, which is a much narrower line, the light beam was evidently focused much sharper than in the other case."

The width of the line traced on the oscillograph film also depends on the **rapidity of motion** of the spot of light across the film. For example, observe the exceeding sharpness of the 60 cycle line on the upper

part of Exhibit No. 189. This line having much more rapid motion across the film than either of the lower lines is the sharpest. Also observe how much sharper is the irregular line A to D than either of the base lines at the beginning of the film. The wavy line B to C is much wider than either of the others, due to the **slow rate of motion** across the film arising from the more nearly constant conditions between electrodes B and C than obtained between electrodes A and D.

The plaintiff also erroneously contends (page 79) that the wavy line B to C of oscillogram Exhibit 189 must have started from the upper base line marked A to D in the left end of Exhibit No. 189, because it is apparently wider than the lower base line marked B to C. The optical system of the oscillograph is such that a line considered deflected or elongated from its base may make a wider trace than was traced on the base, as instanced by a beam from any ordinary mirror held in the hand and projected on any angle against a wall. This is the case on the record in Exhibit 189.

The plaintiff further erroneously contends (page 80) that the irregular line marked A to D could not have followed from the upper base line marked A to D because it dropped below this base at several points in the length of the film. Both base lines A to D and B to C were not **zero** lines but represented some **initial deflection,** due to the condition of the inside of the hose between the electrodes. These base lines were obtained between two shots of concrete from the Hackley gun in regu-

lar operation in lining the Melones tunnel. During the interval between shots the interior of the hose was neither clean nor dry; consequently some conductivity existed between electrodes A and D and between electrodes B and C. During the passage of the shot the irregular line A to D shows that there were brief intervals when there was a greater resistance between electrodes A and D than existed before the arrival of the shot.

Attention is called to the obvious fact that the character of the wavy line B to C is entirely different than the character of the irregular line A to D. If the plaintiff's claim that the base line was interchanged was true, the upper wavy line B to C would have been deflected practically the same amount from the upper base as the irregular line A to D is deflected from the lower base. Hence, the element producing line B to C could not have been shunted.

Irrespective of the base line from which the wavy line B to C was deflected, attention is called to the fact that at no time during the entire passage of the shot did this line drop to either base. If the concrete had traveled through the discharge pipe in slugs with air between, line B to C would have dropped substantially to its base. Obviously it did not do this at any time during the entire passage of the shot of concrete.

There is nothing in the slug theory that will in any way account for the difference in the character of the wavy line B to C and the irregular line A to D. The character of the lines on the film can only be explained

as Mr. Wilkins explained them,—that the concrete was passing through the pipe in a substantially constant proportionate mixture of concrete and air with a greater amount of air at the top of the pipe between electrodes A to D than existed at the bottom of the pipe between electrodes B to C.

PLAINTIFF'S SPURIOUS DRAWING, "PLATE FIVE."

Plaintiff resorted in its briefs below to another drawing designated as "Plate Five," which appears again in its brief before this Court opposite page 85.

This "Plate Five" of appellant is deceiving and incorrect, as seen by a mere comparison with the original defendants' oscillogram (Exhibit 189) in evidence. Appellant says (middle of page 85):

> "On Plate Five petitioners illustrate the first seven seconds of the record of Defendants' Exhibit 189 in which the length of the record has been foreshortened by a photographic process from substantially 50 inches down to substantially 8 inches * * *."

Anyone knows that to **foreshorten** even a straight piece of string is to cause it to fold and no longer become straight. In foreshortening a wavy line, naturally you make humps where there were simple curves before, and if it is assumed that this is a record, the original record with the curved lines is so grossly distorted as to be no longer recognizable. Plaintiff-appellant has simply buckled up a crooked line to suit its needs and said it was defendants' curve.

In order to show the crudeness of this attempted imposition on the Court, we have produced here opposite a photostat facsimile of this "Plate Five" of plaintiff's bogus drawing and below it a facsimile of the true seven-second length of defendants' Exhibit 189.

Referring to the drawing of the apparatus (Exhibit 188) and the oscillograph (Exhibit 189) Wilkins says (R. 444):

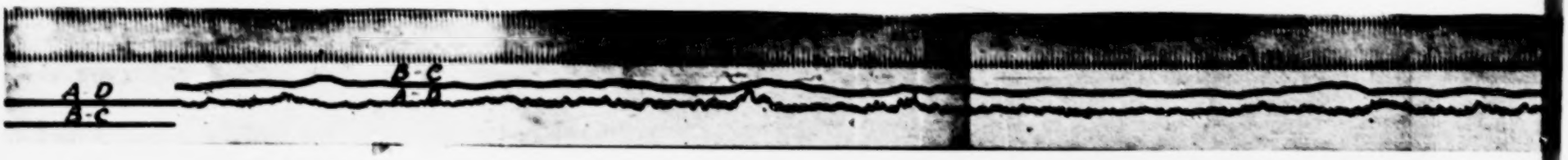
> "A. When the pipe is completely full the deflection from the zero which is indicated at the start would extend nearly across the film. It was a solid concrete, as concrete flows out without any admixture of air. In this, it indicates that the concrete is mixed on the bottom with air to a great enough extent to drop down that deflection about half way. On the top there is much more air that gives it more of a wavy motion and very much less deflection. Such little jumps as are shown in these places indicate that more current would pass through it, and there is more evidence at the back end of the film where the pressure drops somewhat. Such an indication as this indicates that there was more concrete went through between those electrodes at that time.
>
> The whole film indicates that the flow is practically uniform with a mixture of air, which remains the same.
>
> * * * * * * *
>
> A. More solid than at the top."
>
> * * * * * * *

(R. 446):

> "A. The general conclusions were that the concrete flowed through the pipe with a proper supply of air, practically a uniform mixture of air and concrete, somewhat denser at the bottom. That if the air pressure dropped, you could make

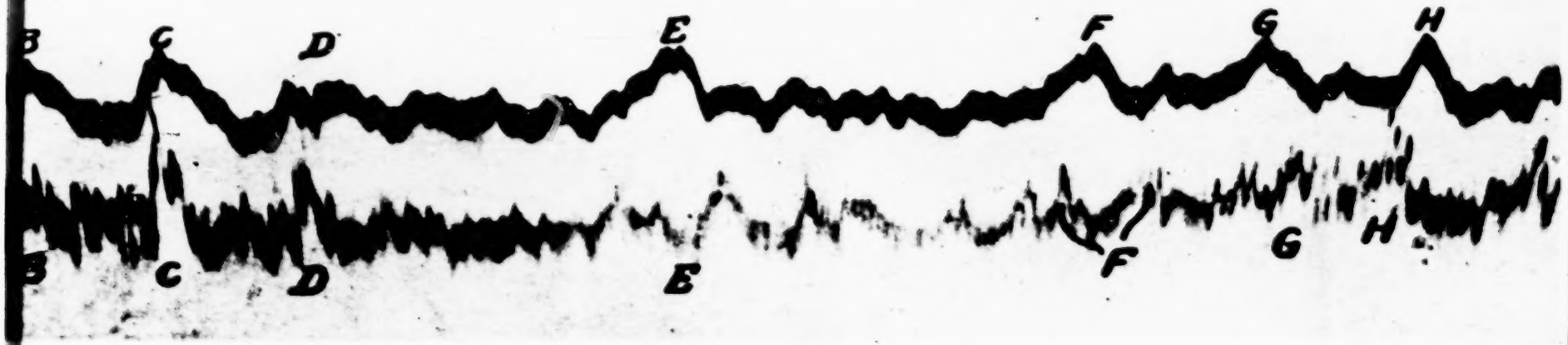
PLATE FIVE

Plaintiff's Deceptive Drawing - Plate Five (Opposite Page 48)



A True Reduction for 7 Seconds of Length of Oscillogram of Exhibit 189.

PLATE FIVE



Plaintiff's Deceptive Drawing - Plate Five (Opposite Page 48)

A True Reduction for 7 Seconds of Length of Oscillogram of Exhibit 189.

it vary somewhat. However, it was still a mixture of air and concrete.

Q. Did you ever encounter any slugs or plugs such as Mr. Ray, plaintiff's expert, has referred to?

A. There were not.

The COURT. **Do you mean that this was a continuous flow of the mixture? I want to know if this was a continuous flow of this mixture?**

* * * * * * *

Q. Indicates what?

A. **That it was a continuous flow** of the mixture of air and concrete."

CONCRETE FLOWED OUT LIKE DISCHARGE FROM A WATER PUMP.

Continuing, Mr. Wilkins testified (R. 446):

"Q. And did you observe the concrete flowing or issuing from the discharge pipe?

A. I did.

Q. And how did that correspond in appearance with your scientific record here?

A. **It corresponds to my mind exactly in that it flows out of the end of the pipe much the same as the discharge from a deep well turbine pump, I would say.**

The COURT. **Well, how is that?**

The WITNESS. **It has a uniform flow without any spurts or dumps and not necessarily solid.**"

On conflicting evidence the Court found in favor of "continuous flow" as against plaintiff's slug theory.

PETERSON CORROBORATES WILKINS.

Mr. Peterson, an eminent engineer in the employ of the Pacific Gas & Electric Company of California corroborated the Wilkins tests, not only in regard to

the specific tests on concrete, in question, but showed that substantially the same electrical method employed by Wilkins was used years earlier by Peterson, only on a more gigantic scale, in ascertaining the rate of flow of subterranean streams. Thus, (R. 451):

> "A. We put down an upper well—a central one and then on the arc of a circle we put three or four lower wells assuming that the water was traveling down a river valley or something of that nature and we decided to explore the rate at which water flowed forty or fifty feet below the ground surface; also the directions; and we placed electrodes, which are metal rods, in these lower wells with wooden insulators around them and we connected up from the casing to these rods —made a connection there to an ammeter and then we put a salt solution in the well, and we determined the time it took to reach the lower wells and also the direction of the flow, and from that information and from samples of materials obtained we could make an estimate of the quantity and direction of the underground flow."

* * * * * * *

(R. 456):

> "Q. Did the saline solution decrease or increase the conductivity of the water?
> A. Increased the conductivity."

A summary of the Wilkins tests indicates:

1. That the flow does not occur in blocks or slugs.

2. That the flow is a mixture of air and concrete, i. e., aeration.

3. That the mixture of air and concrete changes along the pipe.

4. That the mixture of air and concrete at the bottom of the pipe is somewhat more dense than at the top, giving better electrical conductivity.

5. That the average velocity at the beginning of the discharge pipe is over 20 ft. per second.

Contrast Between the Wilkins and Ray Tests.

Wilkins' apparatus is 50 times as sensitive as Ray's, since Wilkins records impulses up to 5000 per sec. against 100 per sec. by Ray's.

Wilkins records:

1. **Position** of material,
2. **Character** of same mixed with more or less air,
3. And **rate of flow.**

Ray records none of these factors, but merely **impacts** resulting from **change of direction** of flow; i. e., the **projectile effect** of concrete, or of stray large rocks in the concrete.

The Wilkins tests are in accord with the testimony of all the witnesses except Ray that the flow of concrete from defendants' apparatus is **continuous** and not intermittent or slug or piston like.

LARKIN AND LEAKE DISPROVE PLAINTIFF'S SLUG THEORY.

If it is desired to pursue the "slug theory" farther, we have only to refer to the depositions of Larkin and of Leake whose inventions are like and preceded McMichael and who sold their inventions and patents to the plaintiff and who each declare flatly against the presence of any "slug action" in blowing concrete. The facts concerning their early experiences have heretofore been successfully suppressed by plaintiff.

The deposition of Mr. Larkin was taken for two special reasons:

(1) To substantiate the facts contained in affidavits made **as far back as** 1909 by Mr. Larkin and his co-inventor, Mr. J. W. Buzzell, in connection with his patent applications above, that they had made their invention, which in all essential features was the McMichael invention, **as early as December,** 1904.

(2) That in the machine they had built and tested in a practical commercial way and which tests were written up and elaborately illustrated with photographs in **"Engineering News"** for **November 25, 1909** (Defendants' Exhibit 71), the operation of **flow and discharge** of the concrete flatly contradicted plaintiff's "slug" theory.

LARKIN, AN ABLE ENGINEER AND A PRIOR INVENTOR, SAYS FLOW CONTINUOUS.

Remembering that Larkin was a hostile witness and admittedly biased in plaintiff's favor by virtue of self interest, he naturally tries to deprecate the success of his own efforts and glorify those of McMichael. But it is not seen why the advantages of the McMichael embodiment would not inhere in the Buzzell and Larkin embodiment, and, conversely, why the disadvantages or troubles, if any of Larkin's, would not necessarily find duplication in McMichael.

LARKIN REFUTES THE SLUG THEORY OF RAY.

Larkin, examined in this case for the first time says (R. 493-94):

"Q. Did the concrete come out as shown in the photograph entitled Fig. 2 in a solid stream or did it issue in slugs or pistons?

A. A certain number of times when conditions were favorable there was a **continuous unbroken discharge of concrete until all the batch** had been shot out of the end of the pipe. Whenever the machine operated it discharged the **whole mass at one time,** and no attempt was ever made to discharge the material in any other way. There were very many trials made at which failure resulted from arching or plugging. In the whole history of this particular type of apparatus the difficulties mentioned were never eliminated and no attempt was ever made to move the concrete except in a **continuous mass,** discharging a complete batch at one time.

Q. Did the **concrete ever come out in slugs or pistons?**

A. **Never.**"

LARKIN'S APPARATUS USED ONLY THE AIR PRESSURE ON TOP OF THE MASS, SHOWING EVEN WITHOUT THE SECONDARY AIR OR SYPHON JET IT WOULD BLOW CONCRETE AND BLOW IT IN A CONTINUOUS MASS.

(R. 494):

"Q. Did you use air pressure on top of the concrete only in the gun or did you also use a supplemental jet?

A. We never at any time used any method other than that of applying air pressure at the top of the mass of concrete in the receiving hopper or drum."

(R. 495):

"We were encouraged by the fact that we did discharge a certain number of batches in a **continuous mass successfully.**"

LEAKE'S EXPERIENCE LIKEWISE DISCREDITED PLAINTIFF'S "SLUG" THEORY.

(R. 591):

"Q. When you applied the air pressure to A, what happened?

A. It just all went up and landed up here.

Q. That is the concrete in the container A?

A. Yes.

Q. How quick was that?

A. **Instantly.**"

(R. 599):

"Q. About how far up was the outlet of the pipe in the Webster Building where you discharged the mixture?

A. That fifth floor? I don't know. I guess about 12-foot stories, about sixty feet.

Q. And about how high up did you succeed in discharging the mixture in New Orleans?

A. That was about thirty feet."

* * * * * * *

"Q. And in both cases it was **practically instantaneous?**

A. Only the Webster it was not concrete.

Q. It was cinders?

A. Yes."

(R. 601):

"Q. How large a pipe did you use down there in New Orleans?

A. I think it was a four inch.

Q. The regular four inch pipe?

A. Yes.

Q. And how much pressure did you use, do you recall?

A. No. I suppose about sixty or——"

And on cross-examination (R. 602):

"XQ. How long did it take for the material to go from the cylinder of chamber A up through the pipe?

A. **Instantaneously.**
XQ. To the discharge outlet?
A. **Instantaneously.**"

SO-CALLED "PATENT EXPERTS" HAVE NO PLACE IN A SIMPLE CASE LIKE THIS.

We cannot believe that the imaginings of the theorist Ray will weigh very heavy with the Court against the affirmative evidence and actual knowledge of practical men of the type, standing and experience as Wilkins, Peterson, Hackley and McCormick.

> "In deciding between contradictory expert testimony, juries should consider the respective reasons, ability, knowledge, and fairness of the experts. * * * And testimony based on experience is more weighty than testimony based on the theoretical consideration." (*Walker on Patents*, Fifth Edition, Section 498, pages 564-565.)

PATENT EXPERTS AS ANCILLARY COUNSELORS.

Defendant here offered no expert on the subject of the patent in suit or on the prior art for the reasons given by Judge Buffington in *Krupp v. Midvale Steel Co.*, 191 Fed. 588, 596 (3 C. C. A.):

> "The nature of their disclosure is all set forth in plain terms in their specifications, and we may here remark that it is only where a court requires the explanation of technical terms or the language of any particular art to enable it to understand a specification that the evidence of those expert in the art is pertinent. The province of such expert testimony is to remove uncertainty where the terms used are obscure, and is not to create uncertainty where the language is plain."

The argument of Mr. Ray, as far as he was permitted to argue the case for the plaintiff and his evident purpose on the stand, forcibly recalls the observation of Judge Coxe in *Steam Gauge Co. v. Man. Mfg. Co.*, 28 Fed. 618, where he said:

> "supplemental though it be by the opinions of those **ancillary counselors called experts,** whose arguments upon the law and the facts terminate in a jurat and are frequently referred to as affidavits."

This objection is voiced also by Judge Learned Hand in *Kohn v. Eimer,* 265 Fed. 902:

> 'When the judge has understood the specifications, he cannot avoid the responsibility of deciding himself all questions of infringement and anticipation, and the testimony of experts upon these issues is inevitably a **burdensome impertinence.**
>
> "Now the question whether the judge needs the assistance of experts to understand the specifications **is for him to decide.** * * * The important point is that **it is he who must determine when he needs the help of experts and when he does not, and that decision, except in the clearest case, we should not be disposed to disturb.** * * * One of the chiefest scandals of the old procedure was the interminable examination of experts, to extract their opinions upon the very issues which the courts alone could decide. The logomachy which resulted from the cross-examination of an expert by the opposing lawyer was arid beyond belief. No one read it, every one was annoyed by it, and some one paid for it." (Boldface ours.)
>
> See also *David v. Harris,* 206 Fed. 902, 904. (2 C. C. A.).

There was no abuse of discretion by Judge Bourquin's refusal to hear argument by the witness Ray

on the contents of patents as simple as those in evidence. Nevertheless Ray has put his argument into plaintiff's brief.

No error was committed by the trial court in preventing Mr. Ray from arguing the prior art patents. The patents are so simple that they speak for themselves. Whether or not the trial judge desired expert evidence in regard to them was a matter within his discretion. Manifestly relieving this Court from the tedium of reading endless pages of expert argument was not an abuse of discretion.

Had the floodgates of expert testimony on these patents been allowed to open, there might easily have been the result noted so picturesquely by Judge Dayton in *Bryce Co. v. Seneca Glass Co.*, 140 Fed. 161, 167, which has become a classic on the subject.

In commenting on plaintiff's claims to a slug action to carry novelty in McMichael over the prior art Judge Bourquin admirably stated the proposition and the answer (R. 615):

> "Plaintiff's contentions as they appear in its brief are that McMichael invented (1) the hopper-bottomed container; (2) application of compressed air to convey concrete; and (3) the method of the lower air to detach portions of the concrete, which alternating with like slugs of air, are driven through the discharge pipe.
>
> "In respect to the first, containers with hopper bottoms to direct the flow of their contents preceded McMichael for time so long, the memory of man runneth not to the contrary.
>
> "In respect to the second, long prior to McMichael were many devices more or less like his, in which the art of compressed air to convey

mobile substances was developed and used. Whether or not it had yet been applied to concrete, to the latter is but a new and analogous use, devoid of novelty or invention.

"The affinity and analogy of concrete to other mobile substances, commonly thus conveyed, was recognized by McMichael himself in his association of it with sand and other granular materials in his original application. His subsequent exclusion of all but concrete of those so associated is suggestive of preparation for litigation to come. To extend the art to concrete when it came into extensive use, not invention, but only common sense, to say nothing of ordinary mechanical skill to be expected in the progress of the art, was required. In principle, it differs none from like extension of the use of a wheelbarrow to convey concrete.

"For a principle, appliance and method applied to substances in general, will naturally embrace any new substance, even as a statute relating to a genus will open to include newly created species.

"The instant case cannot be distinguished in principle from Concrete etc. Co. v. Gomery, 269 U. S. 177, 46 S. Ct. 42, 70 L. Ed. 222, wherein it is held that appliances and method of conveying mobile substances by gravity extended to concrete when it came into use, and a subsequent patent to thus convey concrete is invalid.

"For gravity, substitute compressed air, and that case 'reads on' this."

PRIOR ART.

Further, Judge Bourquin said:

"Moreover, prior to McMichael were patents for appliances and methods to convey concrete by the agency of compressed air. Amongst these

are Smith, 122,498 of 1872; Cannifff, 873,345 of 1906, and McIlvrid, 958,421 of 1905.

"In so far as it is argued that some of these are for grout, and will not function with less liquid concrete, the answer is they can be used for any practical flowable concrete, and they have been. They are of the simplicity of McMichael's, and even average intelligence will perceive their ability to operate successfully."

CONCRETE AND GROUT DIFFERENT ONLY IN DEGREE; BOTH A CONCRETE.

Further Judge Bourquin said:

"The variety of concrete is not material, save in respect to the mere incidentals of pressure and size of container, load, and discharge conduit.

"In any apparatus, including McMichael, the concrete must be flowable in quality, and the pressure in due proportion to the weight and friction of the load ahead of it. To suit these incidentals to circumstances is mechanical, and not invention.

"And this is true, be the container capacity or load discharged in one slug (continuous stream) or in several shorter slugs."

PLAINTIFF'S SLUG THEORY.

Continuing Judge Bourquin said:

"Adverting to the third of plaintiff's contentions, the first observation is that the slug theory is not proven and is untenable.

"With 100 pounds of air from the primary upper air pipe behind it, the concrete stands not on the order of its going, but goes at once. And through the discharge pipe 'with great rapidity and speed.'

"In these circumstances, the upper air does not halt until the lower air has neatly cut off and removed a slug of concrete, nor does the lower air, of like pressure from the common reservoir, halt until within the field of its activity has been projected sufficient concrete to form any slug.

"In the nature of things, the patent now stipulating what the application originally did not, viz., simultaneous and constant application of both upper and lower air, the lower air can but some disintegrate and aerate the mass of concrete as it rushes by, and thereby lubricate, lighten and assist its flow through the conduit. The lower air but joins and flows in the same direction and with the stream of concrete.

"It may be that, if the upper and lower air were alternately applied, some *quasi* slug action would follow, akin to the action of Saunders' 'air-lift pump,' patent 597,023 of 1896, but not when simultaneously applied as here."

PLAINTIFF'S THEORY DOES VIOLENCE TO THE LAWS OF NATURE.

Judge Bourquin speaking from the record and from his very considerable experience with things mechanical, finds as a fact:

"Taking McMichael as it is, to expect or secure movement of the concrete in alternate slugs of concrete and air would do violence to the laws of Nature and confound reason. It cannot be done."

ON CONFLICT OF EVIDENCE DEFENDANTS' TESTIMONY IS CREDIBLE AND PLAINTIFF'S INCREDIBLE.

Concluding this branch of the case the learned Judge found:

"Moreover, the proof is clear, by plaintiff's witnesses as by defendants', and some who are interested in plaintiff, that the concrete discharges in a continuous aerated or mixed stream of concrete and air, and not at all in any slug formation.

"As between Wilkin's test, discrediting the slug theory, and Ray's supporting it, the former's is calculated to more nearly approach accuracy."

The Ninth Circuit Appellate Court said (pp. 840-841):

"There was no suggestion of a slug theory in the original application of McMichael, * * *

"The slug theory was obviously adopted, from expressions found in Leake's application, * * *

"It is stated in the brief of appellant's counsel that the appellee's engineer, Hackley, admitted that the appellant's apparatus 'operates on the slug principle.' We do not so understand Hackley's testimony.

* * * * * * *

"Brock, a witness for the appellant, testified that in the Skagit tunnel the concrete, when it came out through the 8-inch discharge pipe, 'flowed down gently like over both sides.' And such was the testimony of all the witnesses who observed the operation of the device in the Skagit tunnel.

"In fact, there is but one witness for the slug theory, Ray, a consulting engineer and patent expert. * * * The court below credited the testimony of Wilkins as against Ray, and we think the court was supported by the overwhelming weight of the testimony.

"We think that the slug theory, when all is said, has no bearing upon the merits of the present controversy, for, whether or not the appellant's apparatus operated to deliver concrete in

slugs or sections, it is very clear that the Hackley apparatus operates in delivering a constant stream of concrete, interrupted only so far as it is interfered with by the air which accompanies it through the discharge pipe."

PLAINTIFF'S SO-CALLED ARCH BREAKING NOZZLE.

In the later stages of this litigation and after the *Storrie* case reached the Circuit Court of Appeals, the plaintiff shifted its position on the "slug theory"; practically abandoning it and fell back on the so-called "arch breaking nozzle."

ARCH BREAKING NOZZLE.

Plaintiff has abandoned one line of theory after another until it has fallen back on the so-called "arch breaking nozzle." In the New York litigation it was the "slug" theory that constituted the novelty. Plaintiff emphasized in those cases that the concrete operated in slugs and that McMichael was the first to shoot concrete because McMichael discovered the slug theory which made it possible to shoot concrete! In other words, the claim of plaintiff has always been, until recently that the McMichael invention resided in the ability to convey concrete through a conduit by compressed air and to do that **with or without** the so-called "arch breaking nozzle."

But, there was nothing new in such a nozzle so placed whether it was to "break arches" or to act, as

it necessarily does wherever used, as a booster or secondary jet to the air pressure on top of the mass to be moved.

The idea of two air forces, one acting on the body to be moved and the other in the conduit on the substance in movement, is notoriously old in the art and long before McMichael.

THE "ARCH BREAKING" JETS OF DUCKHAM & KOLSCHE.

We only need to mention two outstanding references relied on by the trial and appellate Courts and fully discussed post: to-wit, the Kolsche patent and the Duckham patents. (For Kolsche see photostat enlargement, and appendix to this Brief.)

To quote from the translation of Kosche (pp. 183-4, Book of Exhibits):

> "The receptacle **b** is filled with the material through opening **k**, the cover of the latter is closed * * * the main air supply valve in front of **a** and valve **g** opened. The latter is done, so that the same air pressure prevails above the mass to be moved as below it, and so that it will drop unobstructed into the air pipe **d**. * * * When the particles drop they are engaged in pipe **d** by the air current and driven through the entire passage."

Kolsche has certainly not only the equivalent of plaintiff's "arch breaking nozzle," but has disposed in just the same position as plaintiff shows it in its commercial machine and as presented in the photographs of the Ransome-Canniff (or the Ransome-McMichael)

gun reproduced at pages 89, 90 and 91, Book of Exhibits. The only difference in the world is that the booster jet of the Ransome-Canniff (or Ransome-McMichael) is that in the plaintiff's so-called commercial machine, this pipe is shown a little smaller than is the pipe **d** of Kolsche.

This "arch breaking nozzle" idea is proving a back-breaking burden to plaintiff, particularly after illustrating opposite page 76 of its brief Duckham and Kolsche and then having the temerity to add (top, page 76): "No one of the several prior art machines in the lower row comprises a velocity nozzle!" Aside from Kolsche and Duckham's disclosures we have only to call attention to numerous examples of the so-called velocity nozzle in the prior art as for example: Trewent (British); nozzle C (p. 180, Book of Exhibits); Whisler, 669,192, March 5, 1901; jets 'C' (p. 578, same); Sickels, 99,360, Feb. 1, 1870; pipe p (p. 614, same); Rix & Donahoo, 635,270, Oct. 17, 1899; nozzle 35 (p. 618, same).

The Duckham patents discussed later herein appear at pages 598-611, inclusive, Book of Exhibits. The article, on Duckham's use of the invention in his engineering practice, from the Minutes of Proceedings of the Institute of Civil Engineers for 1886 (Defendant's Exhibit 29) appears at pages 185-189, Book of Exhibits.

Plaintiff's attempt to explain away the force and effect not only of the Duckham disclosures but of the Duckham definite practice as outlined in the last mentioned article above, betokens a captious effort to

confuse and becloud the issue. Duckham says in his first patent (page 601, Book of Exhibits):

> "I prefer to construct the tanks of a form **favoring the flow of the mud or 'spoil' to the outlet, and in order to prevent a deposit of mud in the tank so thick that it would not run** freely to the outlet and would therefore remain in the tank, **I prefer to inject compressed air** (with or without an admixture of water) * * * **through a number of nozzles at the bottom** of the tank, said **nozzles being pointed towards the outlet.** By this means the particles are prevented from settling, and are kept in suspension until the whole is expelled from the tank. **Compressed air may moreover be admitted into the discharge pipe with the same object.**"

That description should be definite enough; but note in addition what Mr. Duckham stated at the meeting of the Civil Engineers, as shown by the report at pages 187-8, Book of Exhibits: that he actually used these air jets by reason of necessity of keeping the discharge outlet open. That is all that plaintiff means by its so-called "arch breaking nozzle."

Duckham's experience in this regard, as Engineer to the Millwall Dock Co., is thus stated (page 188, Book of Exhibits):

> "From experiments made with one of the first apparatus constructed on the above principle, the Author found that, with **clay or stiff mud,** if the nozzles of the air-injection pipes were too small, the compressed-air, instead of driving out the material, simply pierced holes through it, escaping through the discharge pipe, and carrying along with it all the liquid and thin material in the tanks. **This defect was easily rectified by rearranging and increasing the size of the injection nozzles, and the apparatus now gives most satisfactory results.**"

If mud and "spoil" (and spoil is analogous to concrete particularly if it contains clay and rocks) will pack around the outlet; and if these compressed air nozzles are necessary to break this obstruction, why isn't that the same thing in exactly the same relation and for the same purpose as plaintiff's so-called "arch breaking nozzle" to break an obstruction?

Plaintiff's argument is an endless repetition of its claim to having discovered its one single feature of the so-called "arch breaking nozzle," but which only emphasizes the poverty of novelty in McMichael.

THE LAW OF THE CASE.

The leading case on the modern history of conveying concrete and analogous substances and to which we have referred is:

Concrete Appliances Co. v. Gomery, 269 U. S. 177; 70 L. Ed. 222;
Same case, 291 Fed. 486 (3 C. C. A.)

All the Judges of the Ninth Circuit accepted this *Gomery* case as controlling; Judge Bourquin saying (R. 616):

> "The instant case cannot be distinguished in principle from *Concrete etc. Co. v. Gomery*, 269 U. S. 177, 465 Sup. Ct. 42, 70 L. Ed. 222, wherein it is held that appliances and method of conveying mobile substances by gravity extended to concrete when it came into use, and a subsequent patent to thus convey concrete is invalid.
>
> "For gravity, substitute compressed air, and that case reads on this."

The Appellate Court gave its stamp of approval as follows (27 Fed. (2d) 838, 839):

> "It is true that Duckham* was engaged in moving a material quite different from concrete, but that fact is not of importance on a question of anticipation. Concrete Appliances Co. v. Gomery, 269 U. S. 177, 46 S. Ct. 42, 70 L. Ed. 222."

THE DEFENSES.

Prior Invention by Leake:

Sufficient has been said to show conclusively that Leake was prior in time to McMichael and had reduced the invention to practice long before McMichael came into the field.

The invention was obviously a simple one. To try it was to prove it. To prove it was a reduction to practice. Reduction to practice was the completed act of invention.

"Test" as Proof of Reduction to Practice.

While obviously the Leake invention comes in this general class of simple inventions, reduction to practice is fortified by actual test made by Leake in 1905.

The date of the actual **test** of a machine in any event determines the actual date of reduction to practice. (*Smith v. Warnock*, 271 Fed. 556.)

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* The Duckham patents and publications (post) had to do with conveying "dredge spoil" which is a material not unlike concrete in consistency and other physical characteristics. As Mr. Peterson, a practical engineer of large experience, testified (R. 454):

> "Q. **What material has about the same handling characteristics as concrete?**
>
> A. I would say a sticky mud containing considerable clay, commonly called muck, would be quite similar with a moderate amount of moisture and the similarity would be even greater with the rock embedded in that, commonly called **spoil.**"

This Leake did in New Orleans in 1905.

Mr. Leake's work in 1905 with concrete on the Stuyvesant Docks at New Orleans (although not extensive) and again in Chicago in 1907 in blowing cinders to the loft of a four or five story building, shows the invention to have been simplicity itself.

Plaintiff's brief on petition for writ of certiorari sought to discredit Leake's testimony, despite the fact that it was evident Leake did everything in his power in this suit to protect his assignee, the plaintiff, by pleading lack of definite recollection, by evasion, and everything but equivocation. Leake is a high-grade, alert, honest man who would not lie even for the plaintiff. Plaintiff-appellant is simply seeking to discredit the testimony now educed which it has heretofore succeeded in suppressing. But "murder will out."

If plaintiff had any reason to doubt Leake's testimony, it should have sought to impeach him on the trial by competent evidence. This plaintiff did not attempt to do because it knew that what Leake said was true and has known it was true since 1909. It comes with bad grace on plaintiff's part to attack their **ally** now.

Any "vagueness" in Leake's testimony is probably due to influence brought to bear on Leake by plaintiff to "forget it" and after he had testified quite fully only a few months previously in the *Great Western* case, and prior to which time he had most fully and completely discussed the subject-matter of his deposition with Mr. Abbett, of Mr. Townsend's office, at San Diego.

As to plaintiff's criticism of Leake by reason of the Leake sketch (Exh. 127), it is misleading on plaintiff's part to seek to give the impression that all Leake did or has to show was this sketch.

Remembering the Leake interference, the buying off of Leake by plaintiff and the proofs that Leake's invention antedated McMichael nevertheless we find plaintiff pretending for priority in McMichael.

It is also to be remembered that Leake came into the Patent Office within a very few months after McMichael, with the same invention that McMichael was claiming, including both the pressure on top of the mass and the so-called "arch breaking" jet. (See the pipes 88 and nozzles 89 of Leake patent, Fig. 3, page 456, Book of Exhibits.)

Whatever plaintiff may say here, it is an indisputable fact that Leake and McMichael being **in interference** were both claiming the **same invention.** All that the drawing (Exhibit 127) was for was to test Leake's recollection and to force him to show, on the stand, despite his reluctance to testify against his assignee, that his recollection in 1927 accorded with the actual facts of 1905. What the plaintiff has failed to tell the Court is the circumstances under which the drawing was made.

The interference was declared shortly after, and the preliminary statements of Leake and McMichael set out the facts as to what each had done.

No other Court in any litigation over the McMichael patent, until this trial, had ever heard of the Leake patent or the Leake invention and how the plaintiff

had bought up Leake. Until the present case, the true facts never came to light in regard to the relative priorities between Leake and McMichael.

Leake was a hostile witness and reluctant to testify. Without his testimony his preliminary statement meant nothing. It was merely a lead which defendant followed up and forced the truth from Leake; and to test the truth of the facts in his preliminary statement, with the object of asking him independently of his patent drawings, Leake was requested to make a sketch while on the stand of what his original device looked like. Leake is not a draughtsman; he is a business man and railroad contractor, but his crude free-hand sketch makes it clear to anyone what the New Orleans structure looked like and how it worked. Whether it was a so-called "arch breaking nozzle" or not is immaterial. The device did shoot concrete and consituted a "reduction to practice." It was prior to McMichael and it anticipates McMichael.

All the cases cited by plaintiff on question of proof, concern witnesses **biased in favor of the party for whom he is testifying, and not to a case like that of Mr. Leake who was manifestly and confessedly biased in favor of the opposite party.**

The fact that Leake is the only witness to the facts testified by him does not render that testimony entitled to less weight than accorded to it by the Honorable Trial Judge who said:

> "For despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence in quality and quantity inspires confidence and con-

strains conviction of the truth of the fact and beyond reasonable doubt." (R. p. 619).

The Ninth Circuit Appellate Court gave ample consideration and authority for the same view.

> **"The rule as to corroboration is one of caution and discretion, and is not a statutory provision."**
>
> *Armstrong v. DeForest*, 280 Fed. 584, 591 (2 C. C. A.).

That Court further said (p. 590):

> "There is no reason to doubt the testimony of the patentee as to the date of his inventive thought. While it is true that uncorroborated testimony of an inventor is to be accepted with caution (Clark Thread Co. v. Williamantic Linen Co., 140 U. S. 481, 11 Sup. Ct. 846, 35 L. Ed. 521), yet there is no rule of law that requires the rejection of the uncorroborated testimony of an inventor as to the date of his conception. The court must be satisfied as to the fact of demonstration and that the conception was complete."

An instructive case on this topic is *Buser v. Novelty Co.*, 151 Fed. 478 (6 C. C. A.) before Judges Lurton, Severens and Cochran. At page 492, after quoting Mr. Justice Swayne in *Coffin v. Ogden*, 18 Wall. 120, 21 L. Ed. 821, the Court said (all boldface ours):

> "If, however, the machine or other thing is complete, and capable of producing the result sought to be accomplished, it has passed the experimental stage and becomes an invention; and, in order that it may constitute an anticipation, it is immaterial how well it becomes known or how much it is used. Mr. Justice Swayne in the same case said:
>
> **" 'The prior knowledge and use by a single person is sufficient.** The number is immaterial.'

"In the case of Reed v. Cutter, Fed. Cas. No. 11,645, Mr. Justice Story said:

"'If the invention is perfected and put into actual use by the first and original inventor, it is of no consequence whether the invention is extensively known or used, or whether the knowledge or use thereof is limited to a few persons **or even to the first inventor.'**

"Walker on Patents, Section 71, says:

"'Novelty is negatived by prior knowledge and use in this country **by even a single person** of the thing patented. This rule applies even to cases where that knowledge and use were purposely kept secret; and it applies, no matter how limited that use may have been.'

"Indeed, it has been held that if the alleged invention is complete, and capable of producing the results sought to be accomplished, though it may never have been used, it is an invention and an anticipation. In the case of Stitt v. Easton R. Co., (C. C.) 22 Fed. 649, Judge Colt said:

"'If the constitution of the prior thing of itself demonstrates that it is within the principle of the patent, then, perhaps, no use need be established; for it might be said to prove itself. **It is not necessary that the prior invention should have been actually used for the purpose contemplated, but it must have been capable of such use.'**"

A recent case where a single witness invalidated a patent is *Mueller Co. v. Zeregas Sons*, 12 Fed. (2d) 517 (2 C. C. A.). In briefly disposing of the question the Court said (p. 518):

"The question of invention as between Mueller and Wild is really only one of veracity. There are no presumptions or artificial rules regulating such an investigation, and **the evidence of one witness may be sufficient.** Tompkins Co. v. N. Y., etc., Co., 159 F. 133, 86 C. C. A. 323. We per-

ceive no reason to discuss this question further, and are satisfied with the decision of the court below."

In *Snead & Co. Iron Works v. Behn*, 4 Fed. (2d) 942, the uncorroborated testimony of the brother of the deceased inventor was accepted as sufficient to establish prior invention; the Court saying (p. 943):

> "But where, as here, a party not only has disclosed the result to be achieved, but has definitely and fully disclosed the means for accomplishing that result, **the only question for determination is whether the testimony of the witness to whom he made the disclosure meets the usual test as to credibility.** In this case, Mr. Angus Macdonald is **a witness of much more than average intelligence, a man of affairs, and, so far as this record discloses, of unimpeachable character.** Speaking of his testimony, the Board said: 'The testimony stands unimpeached in any particular, and there is nothing in any way to cast suspicion or doubt upon its truthfulness. We are therefore convinced that disclosure of the invention at least prior to September 27, 1919, the date on which the letter demanding a conference for the settlement of differences with the Thermoid Company was written, is reasonably established.'"

In *Mayer v. Mafschler*, 248 Fed. 911, 914, the Court said:

> "Certainty beyond reasonable doubt is reached by **quality** of evidence, and much depends on the nature of the thing sworn to. **One witness may suffice** (Tompkins v. N. Y. Woven Wire, etc. Co., 159 Fed. 133, 86 C. C. A. 323) if the surrounding circumstances are confirmatory; * * *"

In *Pennsylvania Steel Co. v. Pettibone, Mulliken & Co.*, 141 Fed. 95, the Circuit Court of Appeals for

the Third Circuit reversed the lower Court who applied too rigid a test to the testimony of a single witness, the upper Court finding the testimony credible, not contradicted and dismissed the bill. The Court said (p. 100):

> "The testimony is not incredible. It was not contradicted. **The witness who gave it was not impeached.** It appears not to have been doubted that the stands he mentioned had in fact been made and used; but, because the learned judge was 'not convinced that the witness was certain as to his dates,' this evidence was wholly disregarded. We, however, are of opinion that it was entitled to consideration, and that it should have been accepted as showing, at least, that upon no admissible construction of the patent in suit could the charge that the appellant's switch-stand infringed it be sustained. Mr. Parsons was the superintendent of the defendant company, but **the story he told was inherently probable, and we find nothing in this record which would justify a suspicion that he did not intend to testify candidly;** and, while it is undoubtedly true that evidence of prior use should be clear and convincing, we see no reason to doubt that he was, as he said he was, enabled to fix the times when the stands he described were made, by relation to the happening of the other events to which he referred, and about which it is extremely unlikely he could have been mistaken."

See also *Westinghouse v. Stanley*, 133 Fed. 167, 178.

Since Leake's and McMichael's applications were copending, the instant case is analogous with respect to measure of proof with the facts of *Wilson & Willard Co. v. Bole*, 227 Fed. 607, 610.

This Honorable Court recently in *Corona Cord Tire Co. v. Dovan Chem. Corporation* (decided April 9,

1928), 276 U. S. 358; 72 L. Ed. 610, held that the uncorroborated testimony of one witness was sufficient to invalidate the product claims of the patent there in suit.

There, speaking of this single witness, the Court said:

> "He is wholly disinterested pecuniarily in the result of this case. The fact that he is the only witness is not fatal or any reason for denying its weight in connection with other circumstances. Reed v. Cutter, 1 Story, 590, Fed. Cas. No. 11,645, 20 Fed. Cas., 435; Coffin v. Ogden, 18 Wall, 120; Egbert v. Lippmann, 104 U. S. 333."

PRIOR INVENTION BY BUZZELL AND LARKIN.

BUZZELL AND LARKIN PATENT 894,813, AUGUST 4, 1908. (Defendants' Exhibit 150, p. 549 Exh. Book.) (APPLICATION FILED JUNE 13, 1907.)

Although this patent was applied for and issued subsequent to McMichael's application, but long prior to McMichael's issued date, and although the Buzzell and Larkin patent **has expired** and is public property, yet **Buzzell and Larkin are shown by the Patent Office record and by Larkin's deposition to have been the prior inventors of what McMichael lays claim to.** That this claim of priority was recognized as having substance is shown by the fact that **plaintiff** obtained **a license** from Buzzell and Larkin and has paid substantial royalties to Larkin and his associates.

Mr. Larkin identified two sketches (Exhibits 70 and 70-A respectively) dated **October 14, 1904,** and **December, 1906.**

(R. 478):

"The originals were made October 14, 1904. I note the date on the sketch marked Exhibit B is December, 1906, in my handwriting. It is to be noted that the 1904 sketches are concerned mainly with mathematical computation, while the 1906 sketches show the proposed form of the conveyor apparatus. One original sketch was made in October, 1904, the other original was made in December, 1906."

(R. 482-483):

"The original sketches were lost as previously described in this testimony, but the tracing made from memory of these original sketches have been lost between the files of Emery & Booth, J. W. Buzzell and myself. It would be difficult to make any satisfactory guess. It should be kept in mind that all this took place nearly twenty years back. There is introduced in evidence as Defendant's Exhibits 70 and 70a the sketches, Exhibit A and Exhibit B, dated respectively October 14, 1904, and December, 1906."

(R. 483-84):

"Q. At the time you made the copies of the original sketches for filing in the Patent Office how did you fix the dates of October 14, 1904, and December, 1906, respectively?

A. I fixed these dates by consulting my diary, of which I have a series for some thirty-four years, since 1893."

He identifies an affidavit which he made in 1909-1910 for the Patent Office to establish priority and declared the facts therein stated to be true and correct; approved and accepted as such by plaintiff.

The affidavit reads as follows (R. 487-88):

"WILLIAM H. LARKIN, JR.,

being duly sworn, deposes and states as follows:

I am the William H. Larkin, Jr., who filed the above entitled application for patent conjointly with Josiah W. Buzzell on January 25, 1909.

Prior to the 29th day of October, 1909, the idea occurred to me in the course of my duties that concrete or like segregated rock bearing, cementitious material might be conveyed by fluid pressure. Shortly thereafter and **prior to October 29, 1906,** I discussed this idea with the said Josiah W. Buzzell at South Boston, Mass., and as the result of said discussion **we jointly invented and developed the method of conveying concrete and like cementitious** material disclosed in the above entitled application. As a result of said discussion, I made in the United States sketches on or before October 14, 1904, illustrative of and disclosing the said invention and means whereby the same could be carried out. Blue prints of said sketches were attached to my previous affidavit filed in this case and executed about August 27, 1909, and marked 'Exhibit A.' Said original sketches I am retaining in my possession for future use in possible litigation or interference.

Prior to October 29, 1906, and in conjunction with the said Buzzell, I reduced to practice the said invention in the United States by conveying concrete by fluid pressure in the United States in the manner described in my above entitled application and as disclosed in the amendment accompanying the supplemental oath executed on even date herewith."

This is clear proof of priority of invention against the subsequent efforts of McMichael of everything disclosed in the Buzzell and Larkin patent which was filed June 13, 1907, only five months after McMichael.

The plaintiff's interest in the Buzzell and Larkin patent is shown to have been acquired as late as 1920 and to have been substantial (R. 498).

THE RANSOME COMPANY AND THE PLAINTIFF IN A COMBINE TO CORRAL ALL PATENTS IF ONLY FOR THEIR NUISANCE VALUE.

Continuing Mr. Larkin testified (R. 502):

> "The Ransome Company has certain patents of its own in this field. They and the Concrete Mixing & Conveying Company have a mutual agreement by which they share the use of each other's patents and a certain arrangement of the profits, the exact facts of which I do not recollect."

(R. 503):

> "Q. What were the reasons inducing the Pneumatic Concrete Conveyor Company to grant a license to the plaintiff in 1920?
>
> A. The reason was largely based on the **history of the apparatus as a whole.**"

(R. 504):

> "The plaintiff company believed that it would be to their advantage to consolidate all the patents in this field and particularly the Buzzell-Larkin patents, not so much because of their value as patents but because of the advertising that they had received and because of the fact that both Buzzell and Larkin had been long known in the engineering field."

(R. 505):

> "At the time the license was granted to the Concrete Mixing & Conveying Company we believed that the years of development work that we had performed and the history of our experi-

ments were of more than a little value to that company. The Concrete Mixing & Conveying Company of its part was entirely conversant with the history of the Pneumatic Concrete Conveyor Company's apparatus and method. They were more than pleased to absorb the company in the way they did for the sake of the advertising value of the older concern and to obtain the association, engineering advice and assistance of Messrs. Buzzell and Larkin."

NUISANCE VALUE OF McMICHAEL AND OF LARKIN.

(R. 506-7):

"Q. What value had these Buzzell and Larkin patents 894,813 and 951,754 at the time when the license was granted by the Pneumatic Concrete Conveyer Company to the Concrete Mixing & Conveying Company, if any?

A. It was understood at the time that no value resided in the patents themselves but that the engineering experience of Buzzell and Larkin in this field was an asset.

Q. Did you consider that the Buzzell and Larkin patents **had only a nuisance value?**

A. No, **except it was the policy of the Chicago company to control any and all existing patents** in the field.

Q. Your sympathies, Mr. Larkin, are entirely with the plaintiff in this litigation are they not?

A. Why **practicallly it could not be otherwise because if the plaintiff loses we personally lose.**"

NEITHER McMICHAEL, NOR LEAKE, FIRST IN THE FIELD.

Judge Bourquin, after finding that Leake was as a matter of fact, prior to McMichael, further held in favor of defendant's contention that neither Leake

nor McMichael could rightly lay claim to being the originator of the thing claimed and patented. Judge Bourquin says (R. 619):

> "Neither of them, however, is inventor of the thing. Before them, it was old in the art."

PRIOR USES AND PRIOR PUBLICATIONS, PATENTS, ETC.*

At the time McMichael applied for his patent in January, 1907, compressed air had been employed to convey innumerable substances including:

> CONCRETE: (Smith 1872 patent—Defendants' Exhibit 141—and Smith Machine Exhibit 186; McIlvrid, Moir, Leake, Buzzell and Larkin).
>
> GROUT, i. e., Liquid Concrete: (Camniff, McIlvrid, McCormick and Goldie).
>
> DREDGE SPOIL: Duckham British Patents of 1875 and 1885—Exhibits 157 and 158 (Enlargements) and New York Exhibits 29, 30 and 32 descriptive thereof; Hussey Patents of 1894 and 1895—Exhibits 169 and 170 (See enlargements of drawings), also Miami, Florida, witnesses and New York Exhibits 121, 124, 125 descriptive thereof.
>
> GRAIN: Duckham's appliances at the Millwall Docks, London (1896)—New York Exhibits 30 and 32.

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*As a Patent Case this is a somewhat unusual one in the added and unnecessary burdens and expenses laid on defendant by the refusal of plaintiff to stipulate such ordinary matters as the use of uncertified printed patent copies; by refusing to admit dates of publication of scientific papers and publications (see defendant's demand under Rule 58) and, therefore, requiring the attendance of the witness Rowell, Librarian Emeritus of the University of California at considerable and otherwise unnecessary expense to defendant; and by refusing to stipulate the use of depositions previously taken in behalf of the similarly placed defendants in the copending San Francisco, Great Western Power suit, and the Boston, Stone & Webster suit—simply to enable the plaintiff's attorney as they naively said to take "another crack" at some of the witnesses.

SAND AND WATER: Sulphur, La., and Crowley, La., witnesses, Ivens at New Orleans, La., Saunders "Compressed Air Information" (1903), identified and of which the Court may take judicial notice.

OIL: Same witnesses—same publication.

MIXING AND EXCAVATING: Caisson work: Sickles patent of 1870 Exhibit 159 (Enlargement); Rix & Donahoo patent of 1899 (Exhibit 160); Knights Mechanical Dictionary, 1873 (New York Exhibit 80).

SEWAGE: New York Exhibit 27.

MOULTEN SULPHUR: Louisiana witnesses, particularly Keever and Maxwell at Sulphur, La.: Frasch patents (Exhibits 155 and 156).

SAND BLAST: Kolsche German Patent No. 18,394 of 1882 (Exhibit 168) (see Enlargement). (This is almost a duplicate of the McMichael Apparatus).

WATERS: Pohle Patent (Exhibit 152); Saunders (Exhibit 153); Frizell (Exhibit 163); Harris (Exhibits 164-165).

INTERCHANGEABLE SAND BLAST AND WATER LIFT: Butler Patent of 1900 (Exhibit 167) is a good illustration of the **interchangeable** character of these devices. Butler says:

"The particular sand-pump which I have invented could, however, be used for elevating water or other substances, as will be hereinafter described."

PNEUMATIC PAINTING AND WHITEWASHING: Church Patent of 1892 (Exhibit 161); Saunders (1903) pp. 846-862; Alliance Securities Co. v. Roman Paint Co., supra.

ANTIQUITY OF THE USE OF AIR FOR CONVEYING.

Numerous other instances are disclosed in the various publications of conveying all sorts of things by

compressed air; e. g., **coal, mine tailings, cyanide concentrates, paper pulp, sugar house products, acids, brine from salt mines, hot and cold chemicals, injecting ballast on railroads, solidifying quicksands and foundations by cement injections, draining swamps, etc.**

THE RIGHT OF THE PUBLIC TO WHATEVER HAS GONE BEFORE.

"* * * where the public has acquired in any way the right to use a machine or device for a particular purpose, it has the right to use it for all the like purposes to which it can be applied, and no one can take out a patent to cover the application of the device to a similar purpose. Blake v. San Francisco, 113 U. S. 679; L. Ed. 1070, 1072.

"The inventor of a machine is entitled to all the uses to which it can be put, no matter whether he had conceived the idea of the use or not. * * * Here the patent having expired, all the uses to which the machine can be put are free to the public." (*Gibbon v. Loewer*, 79 Fed. 325, 327, 3 C. C. A.)

This miscellany of Pneumatic Conveying apparatuses certainly must be taken in account in determining whether McMichael invented anything. It is inconceivable that the Patent Office would have allowed the McMichael application to mature into a patent if the prior art here in evidence had been before the Examiner while the McMichael application was pending.

Lining tunnels with concrete by various mechanical appliances was notoriously old before McMichael as

seen by the Patent Office records instanced by the following patents appearing in the Exhibit Book: Tucker, 820,747, May 15, 1906 (p. 526); Goodridge, 317,337, May 5, 1885 (p. 492); Williams & Brown, 829,903, Aug. 28, 1903 (p. 534). While none of these patents employed pneumatic means for conveying the concrete, the patents to which we will refer, do, and constitute a full anticipation of McMichael. To use the Smith, McIlvrid, Canniff or Duckham inventions to deposit concrete behind the tunnel forms of Tucker or Goodridge or Williams & Brown, certainly would not have been invention.

The present case falls squarely within the doctrine laid down by the *Gomery* case, supra.

See also the *Spot Welder* case, 265 U. S. 445, 68 L. Ed. 1098 where this Honorable Court found that the prior development in "butt" welding, electric "riveting," "lap" welding, and "projection" welding left nothing patentable in Harmatta's "spot" welding patent.

SMITH PATENT NO. 122,498, DATED JANUARY 2, 1872.
(Exhibit 141.)

This patent was not in the *Ulen* case. It was introduced in the *Powers-Kennedy* case **but apparently without test or explanation and with only the patent description to guide the Court.** The majority opinion of the Appellate Court in that case dismissed Smith with the observation:

> "While this machine discloses the idea of forcing concrete through a pipe by compressed air,

whether it was practically operable may well be doubted."

The evidence in the *Storrie* case regarding this patent is quite to the contrary and shows that the Honorable Judges of the Circuit Court of Appeals for the Second Circuit had not been given sufficient facts on which to base a correct estimate of the Smith machine.

Smith an Entirely Practical Machine.

This is an apparatus and method of **conveying concrete by compressed air** for street paving.

A Smith machine is in evidence as Exhibit 186. It was on this machine that tests of conveying concrete were successfully performed in San Francisco on Wednesday, September 7, 1927; and, **to witness such tests, the plaintiff and its attorneys were formally invited.** For some unexplained reason they declined or failed to accept the invitation. This machine showed itself and shows for itself as capable as McMichael of conveying concrete by compressed air. The photographs of the Smith machine (Exhibits 184 and 185) show the set-up; and the prints from the movie film (Exhibits 190-191-192) show the nature of the discharge and that this discharge is **the same, whether water, grout or concrete!**

Defendants' Tests of Smith & Canniff.

To take these tests out of the category of **ex parte** experiments and to give them a public, official character, an invitation and notice was extended to, and served upon, plaintiff and its several attorneys in both San Francisco and Seattle (R. 211).

THE SMITH PATENT.

Before considering these tests we will see what the Smith patent actually teaches. The patentee says:

> "The object of this invention is to provide for the public an improved street-pavement, an improved method of laying the same, and improved means for carrying said method into practice.
>
> A distinctive feature in my method of laying pavements consists in manufacturing the concrete **composition in a fluid or semi-fluid state, so that it will flow through pipes,** and **in conveying it from the mixing machine to the spot where it is to be laid, in pipes or conduits and flowing it from the pipes upon the ground,** or upon a suitable foundation, where it immediately sets and forms the pavement, its surface being molded to any desired conformation by means of surface molds."

CROSS REFERENCE TO SMITH'S CONTEMPORANEOUS PATENT 122,497 (Defendants' Exhibit 140 for Identification) ON FORMULA FOR CONCRETE.

> "In thus constructing a pavement I preferably **use the composition described in an application for Letters Patent of the United States filed by me contemporaneously herewith;** but in my improved process or method of laying pavements as herein described, I do not confine myself to that particular composition whatever, now known or hereafter to be discovered, the properties of which adapt it to be conveyed and laid while in a fluid state."

Smith Patent No. 122,497 of January 2, 1872 (Defendant's Exhibit 140 for identification, p. 481 Book of Exhibits), is a full and complete disclosure of the formula for and uses of modern **wet concrete.** Smith

in this patent makes cross-reference to his patent 122,498 (p. 1, lines 8-29) as follows:

"In an application filed by me contemporaneously herewith for letters patent of the United States I have described certain improved machinery and appliances for manufacturing and mixing concretes for pavements, buildings, and other purposes, conveying it from the machine to the place where it is to be laid or used, and suitably laying or casting it in molds or otherwise to the required form. **By reference to the specification filed therewith it will appear that such apparatus is specially adapted to the manufacture and use of a liquid or semi-liquid concrete composition which can be conveyed through pipes and cast in molds.** No concrete composition has ever been brought into public use for the purposes referred to which is capable of being thus manipulated; **nor has it been deemed practicable to attempt to invent a composition sufficiently liquid to flow freely through pipes and yet able to set quickly upon reaching its destination, so as to form in a very short time a solid mass of artificial stone.**

(Lines 37-83.) " * * * my invention consists in a composition prepared substantially as hereinafter described, so as to be capable of use in a fluid or **semi-fluid condition, for the purposes specified.**

The Smith Formula.

"I take any good **hydraulic cement, preferably Portland cement, and sand, gravel, or some equivalent of sand or gravel, such as broken shells, slag, etc., and mix them together in about** equal proportions by specific weight. This mixing may be accomplished by any suitable means, but preferably by the machine described in my other application above referred to.

"To the mixture of cement and sand, in the proportion of two parts, by weight, I add three parts, by weight, **of broken stone,** using therefor

any of the varieties of stone suitable for the purpose, such as blue-stone, quartz, the ordinary cobble-stones employed for paving purposes, granite, etc. I then add a quantity of water equal to about three-fifths of the entire mass of materials already commingled, and agitate the mixture thoroughly by mechanical means until the whole is of a fluid character, capable of **flowing freely through pipes** and of **being run into covered molds.** It is then ready for use."

The Smith formula (Exhibit 193) in short is:

1 part cement,

1 part sand,

3 parts broken stone,

Sufficient water to render flowable.

The standard tunnel mix such as used on the Duboce Tunnel in San Francisco where the Smith and Canniff tests were run (R. 466, Exhibit 194) is:

1 part cement,

2¼ parts sand,

4¾ parts rock,

Sufficient water being added to render flowable.

Samples of the Smith formula and of the present-day formula are in evidence as defendant's Exhibits 193 and 194 and are indistinguishable one from the other. When wet they were flowable, and when poured they settled to a practically level surface as is seen by the exhibits themselves.

THE APPARATUS IS PORTABLE.

Smith, in his patent 122,498, continuing, says:

> "In the first place, for the purpose of thoroughly **mixing the materials and conveying them in a fluid state** to the spot where they are to be laid, I employ a portable machine."

The pipes D are "Adjustable and Movable."

FORCING APPARATUS.

The patentee next points out the **object** and operation of his "Forcing Apparatus F."

> "The **liquid composition,** after it has been thoroughly mixed with the **pebbles, gravel or broken stone,** flows off from the mixer through passages **d,** provided with suitable valves, into the pipe **D,** which delivers it wherever it is required for use. When **it is necessary to force the liquid up hill,** or **to convey it quickly or in larger quantities than usual,** or **through long pipes, or** to press it in the mold and expel the air therein; in which it might begin to stiffen before reaching its destination; **I employ a forcing apparatus** to propel it through the pipes, the same consisting preferably, **of a tight chamber F, capable of resisting great pressure,** into which the liquid flows from the mixer, and a **pipe, f, by which steam or compressed air** can be introduced into the **chamber F,** upon the liquid, to force the latter, by pressure, into the pipe D. Any other species of forcing apparatus may, however, be substituted, if preferred."

SPECIFICALLY AND DEFINITELY DESIGNED FOR CONCRETE.

The patentee says:

> "The pipe D may be jointed or flexible, to adapt it to be lengthened or shortened, or moved in any desired direction.

"By reference to my application for Letters Patent upon the composition which I prefer to employ with this machine, it will be observed that the constituent elements of such composition are **cement, sand, water, and gravel, or broken stones.**"

SMITH, LIKE McMICHAEL CLAIMS BOTH APPARATUS AND PROCESS, THUS:

"Having thus described my invention, what I claim is:

"1. The process of laying **concrete pavements** by flowing the liquid material upon the bed of the street, substantially as described.

"2. The **compressing apparatus F,** in combination with the mixer, and the pipes or **conduits,** substantially as and for the purposes described."

Plaintiff makes a number of incorrect statements concerning this patent and its disclosures. Despite the fact that Smith calls for concrete, specifying a mixture of cement, sand, rock and water, "the properties of which are adapted to be conveyed while in a fluid state," plaintiff's counsel has the audacity to say (p. 43 of its brief) and to italicize it:

"*Smith was not handling the same material as McMichael.*"

Plaintiff's counsel attempts to justify this misstatement by saying in the next breath:

"The material which Smith handled, although called 'concrete' was in fact a very thin watery mixture which would flow through a tortuous passage *d* from the mixing hopper C to the air chamber F. * * * He (Smith) also says that the composition is '*sufficiently liquid* to settle to a perfectly *level surface.*'

> "It is clear that concrete to be used in tunnel linings, etc., as conveyed by the McMichael apparatus is not the same as the soupy fluid which was the only thing which the Smith apparatus could handle." (Italics by plaintiff.)

The samples, Exhibits 193 and 194, sufficiently answer plaintiff's contentions.

Manifestly, the plaintiff is brought to sore straights in pretending that the McMichael patent calls for and can be sustained on a certain degree of fluidity or consistency of the concrete.

Concrete is concrete just as "Pigs is pigs."

The plaintiff repeats over and over again (pp. 44-45-46 and p. 35) the misstatement that Smith calls for "liquid concrete."

Perhaps plaintiff is trying to bring the Smith formula within the definition of grout as given in New York Exhibit 111, viz., "Liquid Concrete." We fail to see how that helps plaintiff.

"Liquid" is simply opposed to "Solid" or to "Gaseous."

The definition in Standard Dictionary:

> "LIQUID, (n) 1. A body in that state in which the particles move freely among themselves, but remain in one mass, keeping the same volume, but taking always the form of the containing vessel; an inelastic fluid as opposed to an elastic fluid or gas. Compare fluid; gas; solid.
>
> " 'Mercury is a liquid, yet it is almost twice as dense as steel.
>
> J. D. Steele, Physics p. 26 (A. S. B. 1878).' "

Even if the exact degree of flowability of Smith's concrete were an issue, the truth is that the **Smith**

mix was practically the same mix used today in tunnel work!

The trial Court must have been impressed with the fact that plaintiff, although accorded every opportunity to view the tests, to examine the Smith gun in Court, to cross-examine the several witnesses testifying about the subject, chose to ask not one question nor offer one word in rebuttal, but apparently accepted the tests as conclusively demonstrating the operativeness of the Smith patent for performing all the functions for which it and McMichael were specificially designed. The testimony on Smith stands admitted.

Whether admitted or not, Smith utterly destroys the McMichael patent.

THE TESTS ON THE SMITH GUN.

It was to determine not only the practicability of the Smith apparatus for blowing present-day concrete but to ascertain what his patent taught, that these tests were run.

In the tests referred to, the Smith formula (Defendants' Exhibit 193) was used and also the present day formula (Defendants' Exhibit 194) was used. **The Smith mix was substantially the same mix as used today on tunnel work!**

HACKLEY ON THE SMITH TESTS.

Mr. Hackley, an engineer and practical concrete man, identifies the photographs Exhibits 184-5 and the Smith Machine Exhibit 186, and says (R. 429):

"They represent a machine built for the purpose of shooting concrete through a pipe. The discharge pipe is a four-inch pipe with a four-inch valve on it directly under this container. On top there is a two-inch and a quarter air connection. The air was let into the chamber under a 100-pound pressure. On the side was an opening for filling concrete or materials to be discharged from the pipe. We first filled that container with water and turned on the air and opened the valve at the bottom after plugging the inlets—the charging opened the valve at the bottom and the water was discharged through the pipe."

(R. 429):

"A. I might say that the end of that discharge pipe was about thirty feet from the machine and at an elevation of about twenty feet above it. After shooting the water out, we filled the container with concrete and shot that out in the same manner. We then used concrete—mixed concrete with rock up to an inch and a half in size of two different consistencies or two different mixtures and that was discharged in a continuous stream in the same way."

THE SMITH MIX AND THE PRESENT DAY MIX VARY BUT SLIGHTLY.

Continuing, Hackley said:

(R. 430):

"A. The first mixture by weight—one of cement and one of sand and three of rock. The second mixture, one of cement, two and a quarter of sand and about four and three-quarters of rock."

SET-UP AS NEAR PRESENT DAY WORKING CONDITIONS AS POSSIBLE.

Hackley testified:

(R. 431):

"You said that the pipe of that demonstration machine represented in the photographs 184 and 185, extended up about twenty feet in the air?

A. Yes, sir.

Q. Why was that?

A. Because that is the usual working condition that any concrete gun works in.

Q. How near do the working conditions in other respects correspond for the demonstration to present every-day working conditions?

A. Just practically the same as every-day working conditions as near as we could get them.

Q. In your opinion as an engineer, did they shoot the concrete successfully?

A. Yes, they shot the concrete successfully."

* * * * * * *

On cross-examination Hackley testified that **the opening of the bottom valve has the effect of McMichael's secondary air jet 12:**

(R. 437-438):

"Q. Didn't it flow out?

A. No, it didn't. It dropped out when we opened the valve. Yes, that started up the discharge.

Q. What do you mean by 'dropped'; didn't it flow?

A. When the trap was opened it started the discharge.

Q. Didn't it flow?

A. It acted the same as a jet of air.

Q. What did?

A. The opening of the valve.

Q. Do you mean to say that the opening of the valve acted the same as a jet of air?

A. Yes, underneath it. It started through the discharge pipe.

Q. That is, the gravity that caused that to drop down out of that tank, that was comparable to the action of an air jet?

A. It broke the bond right at the opening. It broke the surfacing of the concrete right at the discharge opening."

(R. 438):

"Q. You said that that concrete came out like a stream of water—in a solid stream?

A. I said it came out in a solid stream mixed with air."

(R. 439-440):

"Q. Then there was a discharge pipe which led from the bottom of that tank horizontally some distance, I presume, and then up about twenty feet?

A. Yes, that is correct.

Q. Then you applied air under pressure to the top of that tank there by an inch and a quarter pipe?

A. That is correct.

* * * * * * *

Q. Did you open the valve after the air pressure was turned on?

A. At approximately the same time.

* * * * * * *

Q. Now, did the pressure acting on the surface of that water force that water down through that pipe in a solid stream, filling the discharge pipe?

A. It mixed with the water as it went out. The air travels faster than the water.

* * * * * * *

A. In a solid stream mixed with the air."

* * * * * * *

(R. 440):

"Q. You operate in the same way with the water and the grout as you did with what you

called the concrete, didn't you?
A. Yes, sir."

PETERSON ON SMITH TESTS.

Mr. Peterson, an engineer of wide experience in this work, testified:

(R. 462):

"A. I was present at tests made at that portal of the Sunset (Duboce) Tunnel. * * * We tested a Smith type gun, 1872 patent, and a Canniff type gun.

* * * * * * *

Q. Well, we first tested the Smith gun with grout, and then we made up a mixture which corresponded as closely as we could determine to the original Smith mixture and then we put through a regular tunnel mix that was being used. We next put through a grout mix—put a grout mix through the Canniff type gun and then we put a grout mix with rocks and with sand—or I should say with cement and sand and rocks—the maximum size of rocks in the case of the Canniff gun being one inch. * * * The Canniff outlet was two inches. * * * The action was similar in using the different substances."

Concerning photographs (Exhibits 184-185) Peterson says:

(R. 463):

"A. * * * 184 shows the Smith gun as it was set up at the time of the test, and Exhibit 185 also shows the Smith gun and the complete discharge line as set up at the time of the test."

(**C** represents the air inlet pipe, **D** represents the hopper or inlet for the concrete.)

Continuing Peterson says:

(R. 464):

"A. Just before the test started I went up and read the gauge on the compressor showing that it was 103 pounds to the square inch. I then went down with a couple of men and attended to the mixing of the materials that were put in so that we would know what went into the gun. That was taken over to the gun. The plug in each instance was put on after the materials were inside. The air pressure was introduced at the top and when the full air pressure was on we opened the cock, opening the valve quickly and immediately the materials were discharged from the gun. I do not want to say immediately, but they were promptly discharged."

* * * * * * *

Smith action alike with either grout concrete or water (R. 464-465):

"Q. Tell us what materials you ran through the Smith gun under compressed air at that time?

A. We used first a grout of one part cement and two parts sand mixture. We then used the **Smith formula mix of one part cement and one part sand and three parts rock;** the parts being by weight, and then we did three shifts of the volume by water. That was the mix used as nearly as we could duplicate those conditions. * * * Well, we washed the machine first before we started, to be sure that there was no obstruction of any kind of that sort. As far as that goes, first of all we applied air through and then we applied water and then the grout and then the concrete mixture. * * *"

SMITE ENTIRELY PRACTICAL.

Peterson says (R. 465-466):

> "Q. Did those tests satisfy you as to the practicability or otherwise of the Smith gun as a gun to shoot concrete?
>
> A. Yes, sir. I would say—I would use it on a large job. I would make a bigger gun but just the same type. The principle was satisfactory. It showed that it had the proper structure or proper general proportions and features to shoot concrete. That was what we were interested in doing."

The Smith formula practically the same as for present day tunnel lining:

The witness identifies Exhibit 193 as a sample of the Smith patented formula for concrete and Exhibit 194 as a sample of regular present day tunnel mix used in the Duboce tunnel.

The Court can see that there is no distinguishable difference between the two. They have substantially the same ingredients, and they flattened out just like all concrete does when poured into molds.

The San Francisco tests with Smith demonstrated:

(1) That the Smith machine (Exhibit 186 and photo exhibits of same 184-185 would shoot **concrete** successfully and as it was **designed** and **intended to do** by the patentee.

(2) That the Smith machine would shoot concrete in a **continuous stream,** as seen by the moving film prints. (Exhibits 190, 191, 192.)

(3) That with Smith as with the more modern machines, there was **no difference in operation** wheth-

er shooting **water, grout** or **concrete,** except in the **color** of the discharge. (Note Exhibit 190 with water has a light colored discharge; Exhibit 191 with **grout** is a little darker; while Exhibit 192 with concrete is considerably darker.)

(4) The consistency of the Smith mix and of the present day mix is not materially different, as seen by the samples. (Exhibits 193 and 194.)

(5) **The Smith mix** and the **present day mix** have substantially the **same degree** of **fluidity** or **flowability.** Both necessarily have the Smith quality of being sufficiently liquid to settle to a level surface.

The Ninth Circuit Appellate Court said of Smith (27 Fed. (2d) 838, 839):

> "The specifications described the apparatus as specially adapted to the manufacture and convection of concrete composition through pipes so as to set quickly upon reaching its destination and form a solid mass of artificial stone, and **uncontradicted testimony** was given of the successful use of the Smith machine in conveying concrete through a pipe by compressed air. The device contained all the features of the appellant's patent except the nozzle for admission of air near the point of exit."

DUCKHAM'S PNEUMATIC MACHINE FOR CONVEYING DREDGE SPOIL.

If any point is made that Smith in his 1872 concrete gun did not disclose the secondary or syphon jet represented by the air pipe 11 of McMichael, we have only to turn to the work of the eminent English engi-

neer Duckham for a full and complete disclosure and an anticipation of everything in McMichael.

DEFENDANT'S EXHIBIT 29 RE DUCKHAM DREDGE.

The practical application of this invention at the famous Millwall Docks, London, is shown in the Engineering Publication Minutes of the proceedings of the Institution of Civil Engineers (1887) in evidence as **Defendant's Exhibit 29.**

This article and illustration, when taken with the Duckham patents, completely meets everything shown and described and claimed, as far as principle is concerned, in McMichael.

Mr. Duckham's own description of his apparatus in said Exhibit 29 is as follows:

> "Duckham's Pneumatic Dredger: Mr. F. E. Duckham, M. Inst. C. E., engineer to the Millwall Dock Co., has introduced a system of discharging the dredged material, which has been successfully adopted at the Millwall Docks and elsewhere. The material, after being dredged, is discharged into capacious cylindrical tanks on board the dredger, or on barges alongside. These tanks when full are closed by air-tight doors; air is then forced into them by means of special air-compressor engines, and the dredged material is discharged, either into the sea, or through long iron pipes onto the land. The apparatus used at the Millwall Docks consisted of an ordinary bucket-ladder dredger, 113 feet long, 27 feet beam, and 12 feet deep, with a loaded draught of 8 feet; and two cylindrical tanks were placed one on each side of the well, having a combined capacity of 240 cubic yards. The same engines were used for either propelling the vessel, dredging or working the

pneumatic cylinder; they were compound engines of 25 nominal HP.; and the pneumatic cylinder was 20 inches in diameter. The discharge pipe was 15 inches in diameter, and 150 yards long, the pneumatic pressure being about 15 lbs. per square inch. From experiments made with one of the first apparatus constructed on the above principle, **the Author found that, with clay or stiff mud, if the nozzles of the air-injection pipes were too small, the compressed air, instead of driving out the material, simply pierced holes through it, escaping through the discharge pipe, and carrying along with it all the liquid and thin material in the tanks. This defect was easily rectified by rearranging and increasing the size of the injection nozzles, and the apparatus now gives most satisfactory results.''** (Boldface ours.)

Duckham was a distinguished engineer, as seen by his numerous patents, not only on dredging, but on grain conveying.

That Mr. Duckham's 1875 patent was not a mere paper patent nor a mere prophet suggestion is evident from the interest that the Duckham invention created in the engineering world, so much so as to be a matter for discussion among a distinguished body of engineers, not only as seen from the excerpt above of Exhibit 29, but further from the following:

New York **Exhibit 30**: I. C. E. 1896: Duckham's Grain Appliances at the Millwall Docks.

New York **Exhibit 32**: Transactions of the Institution of Naval Architects, 1898, pages 127-131, Duckham's Pneumatic Machinery for Loading.

These articles and patents illustrate the extensive practical use of compressed air for loading and unloading ships.

In Exhibit 30, page 303, Duckham, speaking in 1896, refers to his early successful work in **pneumatic dredging** and says:

> "Some sixteen years ago the author designed a dredger for the Millwall Dock Company. It raises the spoil by an ordinary bucket-ladder, and deposits it into a pair of tanks on board, holding about 200 tons. When brought to its place of discharge, the tanks are closed with the exception of pipes for admitting compressed air, and outlet-pipes through which the mud is forced by the air on to land 200 yards distant. The discharge occupies about thirty minutes. The success of this process suggested the use of air for the improved discharging of grain-laden ships, and the author set himself to solve the problem of its efficient application."

DUCKHAM (BRITISH) 4,400 OF 1875. (EXHIBIT 157.)

"IMPROVEMENTS IN DISCHARGING MUD OR 'SPOIL' FROM DREDGERS AND OTHER VESSELS."

Duckham says (p. 1, line 8 of the provisional specification of his first patent):

> "My invention relates to an improved method of discharging the mud or 'spoil' raised by dredging from the dredgers or barge in which it is received and the invention consists in the employment for the purpose of **pneumatic pressure applied in the manner and by the means hereinafter described.**"

At page 3 of the Complete Specification he says:

> "My invention relates to an improved method of discharging from dredgers or barges the mud and 'spoil' raised from the bottoms of rivers, harbours, docks, canals, and other similar places, and the invention consists in the employment for the

purpose of **pneumatic pressure applied as hereafter described.**

"According to my invention the mud or 'spoil' is received from the dredging apparatus in a tank or tanks capable of being closed **air-tight.** These tanks are preferably in the hold of the dredger itself, or they may be in a separate barge, and when full the dredger or barge having been conveyed to a suitable position near the shore or otherwise the receiving apertures are closed and the tanks made air-tight with the exception of **an inlet or inlets for compressed air,** and an outlet or outlets for the mud or spoil. Compressed air is then admitted to the tank to expel the mud, which is conveyed by suitable pipes or hose to the shore or elsewhere."

Duckham chose the **horizontal** type of container. He says (page 4, line 4):

"I prefer to construct the tanks of a form favoring the flow of the mud or 'spoil' to the outlet, and in order to prevent a deposit of mud in the tank so thick that it would not run freely to the outlet and would therefore remain in the tank, I prefer to inject compressed air (with or without an admixture of water) supplied by force pump or other means through a number of nozzles at the bottom of the tank, said nozzles being pointed towards the outlet. By this means the particles are prevented from settling and are kept in suspension until the whole is expelled from the tank. Compressed air may moreover be admitted into the discharge pipe with the same object."

DISCHARGE THROUGH PIPES AS IN McMICHAEL.

Duckham further says (page 4, line 25):

"The apertures beneath the shoots having been closed by proper covers, there is attached to the outlet pipe E a discharge pipe or hose F **by which**

the mud is conveyed to the shore. If the mud is contained in two tanks the two outlets may unite in a single outlet pipe E, as shown, in which case sluice valves are provided in the branches at G so that should one tank be emptied before the other the outlet from such tank can be closed. H, Figure 1, is the pipe through which **air is forced into the tank by an air pump, I,** worked by the same engines that drive the buckets and the screw propeller; K. K. represents the engine cylinders."

And then follows the complete disclosure and anticipation of everything there is left in either the McMichael apparatus or process.

Duckham says (page 4, line 35):

"**In addition** to the **compressed air admitted at the upper part of the tank to press upon the surface of the mud for the purpose of expelling the same, compressed air may also be admitted through nozzles at the bottom of** the tank (with or without an admixture of water, as before mentioned) **to keep the mud agitated and prevent any thick deposit** in the tank. I may provide mechanical agitators or scrapers in the tank for the purpose."

"The invention may also be similarly employed for discharging mud from tanks not fitted in the dredger itself but in a separate barge, a suitable **air pump** operated by steam or other power being provided on board or on shore or a connection made with the tanks in the barge, and the **air pump on board another** barge or vessel."

"Having described the nature of my invention, and the manner of performing the same, I declare that what I claim as my invention to be protected by the hereinbefore in part recited Letters Patent, is **the application and employment of pneumatic pressure,** as herein described and il-

lustrated, for **discharging the mud or spoil raised by dredging from tanks, whether such pneumatic pressure be used alone or in combination with an injection of compressed air or of water through nozzles at the bottom of the tank,** or with **mechanical agitators or scrapers,** as set forth."

DUCKHAM.

BRITISH PATENT NO. 15,348, DECEMBER 14, 1885.

(EXHIBIT 158.)

In Duckham, 2nd patent, he says, page 1, line 7:

"In the apparatus herein described the mud or spoil was received directly from the dredging buckets in a tank or tanks whence it was expelled through outlet pipes by means of compressed air admitted at the upper part of the tank, assisted by compressed air and water injected at the bottom of the tank, to agitate the mud and prevent thick deposit."

(pp. 91 and 96-98 of its brief):

Plaintiff criticizes the Duckham patent for its failure to illustrate in the drawing the exact location of the air nozzles in the bottom of the Duckham tank.

Plaintiff's counsel nevertheless were quite able to interpret the Duckham description, for they said in their brief in the Court below (p. 35):

"It would seem, however, that what Duckham **had in mind,** but did not show, were some compressed air pipes located on the bottom of the tank and probably located at considerable distances from the discharge conduit. It must be remembered that these storage tanks employed by Duckham were enormous affairs. * * * What Duckham probably did was to put some air pipes on the bottom of his tank **many feet**

> **away from the discharge conduit** for the purpose of stirring up the mud and nothing else." (Boldface theirs.)

Just why plaintiff thought these ejector jets were "**many feet**" from the discharge is not clear. The rear jets of Hackley are "**many feet**" from the discharge conduit.

The answer to that is found, as we have already pointed out, in the patents themselves and in the interest created in the engineering field by Duckham's **practical success** with his apparatus.

As to the location of the air jets, note what Duckham says in his first patent (p. 4):

> "* * * I prefer to inject compressed air * * * through a number of nozzles at the bottom of the tank, **said nozzles being pointed towards the outlet * * * compressed air may moreover be admitted into the discharge pipe with the same object.**" (Boldface ours.)

That is pretty definite as to location and function.

Plaintiff chooses to ignore the historical statement contained in the publication (Exhibit 29) entitled "Engineering Publication Minutes of the Proceedings of the Institution of Civil Engineers (1887)," reprinted pages 185-188 Book of Exhibits.

Duckham himself, speaking as a distinguished engineer in charge of the great Millwall Docks, London, and describing this invention said in regard to the only air jets in question (p. 188, Book of Exhibits):

> "* * * the author found that, with clay or stiff mud, if the nozzles of the air-injection pipes were too small, the compressed air instead of

driving out the material, simply pierced holes through it, escaping through the discharge pipe, and carrying along with it all the liquid and thin material in the tanks. This defect was easily rectified by re-arranging and increasing the size of the injection nozzles, and the apparatus now gives most satisfactory results.' "

"SPOIL" ANALOGOUS TO CONCRETE.

Concerning the labored effort of plaintiff to disparage the Duckham and Hussey dredge operations, little further need be said.

In addition to the evidence, both documentary and otherwise, we have the testimony of Mr. Peterson in answer to the following direct question (R. 454):

> "Q. What material has about the same handling characteristics as concrete?
>
> A. I would say a sticky mud containing considerable clay, commonly called muck, would be quite similar with a moderate amount of moisture and the similarity would be even greater with the rock embedded in that, commonly called **spoil.**"

PERTINENCY OF DUCKHAM AND KOLSCHE RECOGNIZED BY JUDGE BOURQUIN.

Tersely summing up the prior art the Honorable Trial Judge said (R. 619-621):

> "Amongst many patents asserted to be anticipatory of the idea and use of the lower air, but three need be considered.
>
> "Of these, the first and second are **Duckham's English patents** 4,400 of 1875, and 15,348 of 1885. They are for apparatus and method to convey the

spoil or mud excavated in dredging. To that end are employed a container for the material, compressed air above or behind it to drive it down to and through the discharge pipe, and like air through several nozzles in the bottom and pointing towards the discharge pipe, 'to keep the mud agitated and prevent any thick deposit in the tank.'"

The Court of Appeals said of Duckham (R. 669):

"We think it indisputable that Duckham, in prescribing the use of pipes for the admission of compressed air in the tank, the same distributed along the bottom of the tank, and one of them locatable at the exit, presented the use of all that is included in the appellant's combination, save and except the U-bend, an exception which is negligible so far as the present litigation is concerned, and if there is distinction in the fact that Duckham used no air pressure above the contents of the tank, and thus omitted one of the features of the appellant's combination, that feature is also absent from the Hackley combination used by the appellee."

DUCKHAM ANTICIPATES McMICHAEL'S CLAIMS IN LETTER AND SPIRIT.

We have only to apply the disclosures of the 1875 Duckham patent to the claims of McMichael to show invalidity of each and every claim of McMichael on which the present suit is predicated.

(Plaintiff declared on the following claims (R. 10): 1-2-17-18-24-29-34-35.)

Take the following typical claims of McMichael and see how aptly they fit Duckham:

CLAIM 2:

In combination,

(1.) a chamber for containing concrete forming materials [or analogous material],

(2.) a conduit leading therefrom,

(3.) a compressed air inlet pipe,

(3a.) connected to a part of the chamber remote from the conduit,

(4.) and another compressed air inlet pipe leading through the chamber wall,

(4a.) and terminating within the chamber near the opening into the conduit in a nozzle directed toward said opening.

Claim 17:

In a device for treating and moving a mass of concrete forming material, the combination of

(1.) a chamber for receiving and containing the said mass,

(2.) a discharge duct connected with the chamber,

(3.) an air inlet pipe connected with the chamber,

(4.) means for preventing the flow of air or materials out of the chamber

(4a.) except through the discharge duct,

(5.) means for supplying air under pressure through the said pipe to the chamber

(5a.) back of the mass of materials therein to push the said mass toward and into the discharge duct, and

(6.) means for causing a jet of air to impinge upon successive portions of the mass

(6a.) in the general direction of the discharge duct to directly assist their movement therethrough.

CLAIM 24:

In a device for treating and moving a mass of concrete-forming materials, the combination of

(1.) a chamber (1) adapted to receive and contain the said mass,

(2.) a discharge duct (14) connected with the chamber

(2a.) and extending from it to a discharge point

(2b.) in a horizontal plane above the chamber,

(3.) and means (pipe 10) for directing a pressure agent into the discharge duct

(3a.) in the general direction thereof

(3b.) to engage sub-masses of the materials and aid their movement through the duct to the discharge point.

We believe that with the foregoing showing, defendant might rest their case.

THE CANNIFF MACHINE, PATENT NO. 873,345, DATED DECEMBER 10, 1907. (APPLICATION FILED OCTOBER 29, 1906.) (Exhibit 149, p. 543 Exh. Book.)

This Canniff invention is **prior art** both as respecting **prior invention** and **prior use**, to McMichael. Mc-

Michael filed January 14, 1907; Canniff filed October 26, 1906. A certified copy of the Canniff File Wripper was offered as Defendants' Exhibit 82 for identification; and by stipulation (R. 402) the date of filing of Canniff is admitted. **This establishes the Canniff invention at least as early as October 29, 1906, which was some months prior to McMichael's filing date.**

THE FIRST APPLICANT IS THE FIRST INVENTOR IN THE ABSENCE OF EVIDENCE TO THE CONTRARY.

This is settled law by the late decision of the Supreme Court in *Alexander Milburn Co. v. Davis-Bournonville,* 270 U. S. 390, 70 L. Ed. 651.

Canniff is for a machine for conveying grout or "liquid concrete" by compressed air.

CANNIFF A VERTICAL MACHINE LIKE McMICHAEL.

(See Model Exhibit 179.)

While the **shape** of the Canniff device is vertical, the patentee says this is unimportant (p. 1, line 60):

> "In the practical application of my invention the form or configuration of mixing chamber C is of secondary importance, and I do not limit myself in this respect, neither do I restrict myself to the identical arrangement of parts herein shown, since modifications thereof may be resorted to with like result.

COMPRESSED AIR ADMITTED ON TOP OF THE MATERIAL.

> "* * * b, is an air pipe extending to any suitable source of supply of air under pressure. This

compressed air pipe b enters a three-way valve b1, communicating through the pipe b2, with the upper part of the cylinder C and through the pipe b3, with the combined air inlet and grout discharge pipe a." (p. 1, line 90.)

"when the valve v, may be closed and the valve b1, reversed to shunt the compressed air into the top of the cylinder C, when the valve e, being opened, the grout is discharged by displacement by the pressure and accumulation of compressed air above it in the mixing chamber."

An early Canniff machine is in evidence as Defendants' Exhibit 179. It was produced during the testimony of the witness Mr. McCormick who was active with Mr. Canniff in the development of this machine prior to 1905. We have also the drawing of the early 1898 McCormick machine (Defendants' Exhibit 175) which preceded Canniff and bore much resemblance to the present-day Ransome-Canniff machines for shooting both grout and concrete.

THE RANSOME-CANNIFF CONCRETE GUN.

The Ransome Company, **licensees of the plaintiff, are also licensees under Canniff** (Robinson R. 123, 524, 571).

A modern exemplification of Canniff as a **concrete** gun is illustrated and described in the enlargement Defendants' Exhibit 210, duly identified on cross-examination of plaintiff's witness, Mr. Robinson (R. 572), of the Ransome Company (see New York Exhibit 95). This article alone, taken with **the fact that the Canniff patented grout gun is used commercially**

as a concrete gun, is sufficient in itself to prove invalidity of McMichael by the prior invention of Canniff and of McCormick.

The Ransome-Canniff machine, shown in the enlargement—Exhibit 210—and described in the publication "New York Exhibit 95," is practically identical with the Ransome concrete mixer and placer shown in the Ransome vertical machine illustrated on pages 89, 90 and 91 as plaintiff's Exhibits 16, 17-A and 17-B.

The Ransome Company later changed the name of the machine from Ransome-**Canniff** to "Ransome Pneumatic Mixer and Placer." (See said Exhibits 16, etc.)

The real reason, no doubt, **why the Ransome Company changed the name without changing the machine** and took a license under McMichael, was **because the Canniff patent expired December 10, 1924.** As far as known, it was about that time, or subsequently, that the Ransome Company took its license from McMichael so as to hoodwink the public by an extension of their patent monopoly; the life of a United States patent being seventeen years.

THE McCORMICK 1898 MACHINE AS PREDECESSOR OF CANNIFF.

For the history of the Canniff invention we have, in addition to the patent itself, the testimony of Mr. Thos. J. McCormick, of Detroit, Michigan, a witness at the trial, who has had perhaps a wider experience

than any other single individual in the use of cementing tunnels in the New York and Boston Subways. Mr. McCormick testified as to the long, extensive and continuous use of the Canniff machine.

In 1898 Mr. McCormick had his first experience in the use of compressed air for the transportation of materials such as cement and concrete, at which time he built a machine, the drawing of which is in evidence as Defendants' Exhibit 175 (p. 681 Exhibit Book) for grouting tunnels by compressed air.

The McCormick machine consisted of a closed receptacle, into which the grout or "liquid concrete" was placed. The air was admitted to the pipe at the left and bottom, and the material in the receptacle was ejected just as it would be by McMichael's ejector 12.

This machine was used on various work in connection with the East Boston Tunnel in 1902-1903 (R. 405) and the Belmont Tunnel in New York in 1905-1906. A very large quantity of grout was placed with this machine, which, after a few years' use, was discarded and junked. **It was the immediate ancestor of the Canniff machine shown in the Canniff patent above mentioned.**

Canniff was master mechanic under Mr. McCormick in the construction of the Belmont Tunnel.

Mr. McCormick says he first saw one of these Canniff machines in operation in 1905 in the Belmont Tunnel (R. 407). An early Canniff machine, having a shipping weight of some six hundred or seven hundred pounds, is in evidence as Defendants' Exhibit 179 (R. 412).

This particular machine is one that witness found in New York at the time he gave his deposition in June, 1927, in connection with the suit of this same plaintiff versus Great Western Power Company, known as the San Francisco suit and since dismissed by the plaintiff. This particular machine (Exhibit 179) was actually made about 1908 or 1909, and as far as witness knows it is the oldest Canniff machine in existence today (R. 412). Witness identified this machine as the same as the Canniff machines he had first used in 1905.

Continuing Mr. McCormick testified (R. 410):

"Q. Now, how did that Ransome Canniff concrete gun compare with or differ from, if it did, the Canniff grout gun showin in the patent?

A. Practically the same, only on a larger scale. There was a larger discharge and a larger cylinder.

Q. In your opinion as an engineer, is there any difference in operation between the conveying of concrete and the conveying of grout by compressed air?

A. Practically none."

* * * * * * *

And (R. 419-420):

"Q. Mr. McCormick, from your experience in handling the work of concrete, and so forth, is this machine, illustrated in Defendants' Exhibit 176 for identification, applicable to the transportation of concrete?

A. Yes, sir.

Q. By means of compressed air?

A. Yes, sir.

Q. In the manner that you have already described?

A. Yes, sir."

Plaintiff's engineer Robinson admits that Canniff machine in evidence as Exhibit 179 "looks like a McMichael machine."

Robinson says:

(R. 525):

> "A. The machine that I have just examined in the basement, it has the plug over on this side where we have the discharge—where we have the discharge there is a plug in there and evidently their discharge is where we have a plug. In other words, as rigged up, to me it looks like a McMichael machine instead of a Canniff machine.
> * * * * * * *
>
> A. Its operations are like the McMichael machine. The way I understand that they have it piped up its operation is like the McMichael machine rather than the Canniff machine. In other words, they have the plug line where we have the discharge line and they have a discharge line in where we have a plug in.
>
> The COURT. Well, does that mean that the blow is on one side of the machine is your case and on the other side, in the other case?
>
> The WITNESS. May I explain it to you?
>
> The COURT. Yes.
>
> A. Here is our discharge line here (indicating) and this is the plug up here (indicating). The plug down in the basement is over here (indicating) and the discharge is over there (indicating).
>
> The COURT. Simply a reversal of the direction of the operation, is that all, or are there any other differences?
>
> A. Reversal in the direction of the operation, yes, sir."

Such mere reversal of fluid flow does not create invention, nor avoid anticipation, as the Court so readily saw.

Plaintiff dismisses the Canniff patent and use in one paragraph (p. 25) but in which these significant sentences occur:

> "*The Canniff patent* No. 873,345 shows another device for handling fluid grout. Canniff developed a device which was a very successful *grout* mixer and conveyor and which is being used by the Ransome Company and others to the present day. It is generally recognized as an excellent grouting machine. But Canniff never contemplated that it should be used for handling concrete. It is not adapted for handling concrete. and has never been practically used for that purpose."

It is not true as plaintiff knows, that Canniff "is not adapted for handling concrete and has never been practically used for that purpose."

THE CANNIFF MACHINE (EXHIBIT 179) IS A STANDARD CANNIFF MACHINE BUILT AS LONG AGO AS 1908 OR 1909.

CANNIFF INTERCHANGEABLE AS A GROUT GUN AND AS A CONCRETE GUN.

In 1916 and 1917 the Ransome Company built a concrete machine according to the Canniff patent and at first called it the "Ransome-Canniff" and later the "Ransome Pneumatic Mixer and Placer" (R. 529, 572: See enlargement, Exhibit 210 from N. Y. Exhibit 95). This exhibit from "Compressed Air," July 1917, (pages 8464-8465), is descriptive of the Ransome-Canniff pneumatic mixer and placer and illustrates the ready and obvious adaption of the Canniff grout gun to the handling of concrete.

It is noteworthy in this Ransome adaption of Canniff and McMichael the Canniff structure has been followed closely, particularly in the use of the syphon or velocity jet outside the concrete container. All that seems to have been borrowed from McMichael was the idea that concrete as well as grout could readily be used in Canniff.

ENLARGEMENT EXHIBIT NO. 210.

Unquestionably the Ransome-Canniff adaption to concrete illustrated and described in enlargement Exhibit 210, was only this reversal, so readily appreciated by the trial Court for Mr. Robinson tells us: (R. 529):

"We called it the Ransome Canniff for a while, and we called it the Ransome Pneumatic Mixer and Placer.

* * * * * * *

Q. Now, does this machine have its air jet arranged as disclosed in the Canniff patent or as disclosed in the McMichael patent?

A. As in the McMichael patent, directly opposite from the Canniff patent."

SAN FRANCISCO TESTS OF CANNIFF FOR CONCRETE.

Mr. Hackley testified (R. 426):

"Q. Are you familiar with the Canniff gun that we have been talking about here in evidence?

A. I am.

Q. Have you ever used one?

A. I have used the same type—the exact copy of it.

Q. Have you ever used a machine such as is illustrated here, Defendant's Exhibit 176?

A. I have—a single machine.

* * * * * * *

Q. In your opinion is the machine shown here on Defendant's Exhibit 176 adapted to blowing concrete?

A. Yes, that will blow concrete.

Q. Have you ever blown concrete with a gun similar to this?

A. I have."

ANY GROUT GUN IS ADAPTED FOR CONCRETE JUST AS ANY CONCRETE GUN IS ADAPTED TO HANDLE GROUT.

The Hackley gun is used for grouting; see photographs of Exhibits 181-182, reproduced pages 683-4 Book of Exhibits, and concerning which Mr. Peterson testified (R. 459):

"Q. Have you ever known of the Hackley gun being used for conveying anything but concrete?

A. Yes, sir.

Q. What material?

A. Grout.

Q. And where was that done?

A. That was done on head three tunnel and head four tunnel of the Pacific Gas & Electric Company and the Maloneys tunnel of the Pacific Gas & Electric Co.

Q. Did you see the Hackley gun blow grout?

A. Yes, sir."

* * * * * * *

(R. 459-460):

"A. Well, the concrete gun has—we used there a six or seven inch pipe which was not convenient to grout with. We used grout with a hose of about two or three inches in diameter and so we simply put a plate on the end of the gun and the nipple welded in that plate for convenient con-

nection of the hose line, and used it as a grout gun."

He identifies the pictures and says (R. 460):

"A. They represent the Hackley gun as used in grouting work at Pit Four Tunnel.

Q. Is that used ordinarily in the ordinary course of practice?

A. Yes, sir, where we use the concrete guns for grouting, especially in lava formations where large volumes of grout are required.

Q. Do the pictures show the reducer for the grout?

A. Yes, sir. In the first picture we have the reducer attached to the gun."

Conversely, the Canniff gun is readily adaptable to shooting concrete and in the San Francisco tests actually did shoot concrete.

Peterson says (R. 460-461) concerning the Canniff gun of enlargement Exhibit 176 and the Canniff gun under the San Francisco tests of September 7, 1927 (Exhibit 183, p. 685 Book of Exhibits; R. 460-461):

"Q. I show you an enlargement marked Defendant's Exhibit 166 for identification. Tell us if you know anything about that?

A. This is a grout gun which I used in general grouting work. One of the several different types of machines. I happen to know that it is the Canniff type grout gun, double cylinder conveyor and it is so arranged that grout can be put in one cylinder while the other is being discharged and it permits a fairly continuous operation.

* * * * * * *

Q. Is the apparatus of that drawing, Exhibit 176 for identification applicable to or not applicable to the conveying of concrete?

A. It is applicable to the conveying of concrete, yes, sir.

Q. Have you ever seen a machine like that blowing concrete?
A. Yes, sir."

Concerning the San Francisco tests with the Canniff gun Mr. Peterson has already been quoted.

Canniff with the usual two-inch discharge pipe and with air only on top of the material, just as in the Canniff patent, worked successfully to blow concrete when the stones did not exceed one inch in diameter. Naturally if you had a larger discharge pipe so the stones would not clog you could use stones of relatively larger diameters.

Mr. Peterson said, just as did all the other witnesses, that the action was similar whatever the substance or material used, whether concrete, grout or water. It is all a mere matter of degree anyhow.

Thus we see again how different in regard to the history of the Canniff invention and its capabilities the record is in the present *Storrie* case from that in the New York suits.

The same fact is true in regard to the next patent which we will consider.

McILVRID PATENT NO. 958,421, MAY 17, 1910. APPLICATION FILED NOV. 2, 1905. GROUT MIXER. (Defendants' Exhibit 151; N. Y. Exhibit 97, p. 559 Bk. of Exhibits.) ASSIGNED TO COCKBURN BARROW & MACHINE CO., JERSEY CITY, N. J.

This is the so-called Cockburn Barrow Machine.

Although the application was filed a year before Canniff, it was delayed in the Patent Office for one cause or another till 1910.

The patentee says (p. 1 line 76):

"The operation of the machine described is as follows: The materials, usually consisting of cement, finely crushed stone, sand and water, are introduced into the cylinder through opening 18, the door 22 being opened downwardly by gravity.

"The door 22 is closed and motive fluid, preferably compressed air at about 80 pounds pressure is admitted to the cylinder through pipe 13; the outlet pipe 16 is opened and the hose 17 held the work to which the grout is to be applied. The pressure of the air within the cylinder holds the door 22 to its seat, the rubber gasket 21 effectively sealing the opening."

THE McILVRID MACHINE.

This is a horizontal grout gun and defendant's machine is a horizontal gun; while Canniff, like McMichael, is a vertical gun.

The McIlvrid patented machine is shown to have gone into extensive commercial use as early as the year **1904** and is in wide use today.

Mr. Jas. McIlvrid, son of the inventor (now deceased) testified in the New York depositions (R. 329-337).

(R. 329):

"Age sixty-one, residence 42 Armstrong Avenue, Jersey City, occupation master mechanic."

(R. 329-30):

"Q. Are you familiar with drawings of the machine?

A. Yes, sir.

Q. You have used them a great deal?

A. Yes, sir, all my life."

He first went with the Cockburn Barrow & Machine Co. of New Jersey in 1906 when they were manufacturing the McIlvrid machine (R. 330) first as foreman, later as superintendent. During the 12 years he was there and until it went out of business about 150 to 200 machines were built (R. 331).

He identifies 1905 catalog C. (Exhibits 100-a and 100-b) of the Cockburn Co.

THEY BUILT ONE WITH A LARGER DISCHARGE FOR CONVEYING CONCRETE.

At (R. 333) McIlvrid testifies:

> "There was only the standard grout mixer manufactured but we afterward built the larger one with the larger discharge."

Mr. H. C. Leporte, a mechanical engineer, at present with the Union Iron Works of Hoboken, New Jersey, testifies (R. 337-356) that he went to work for the Cockburn Barrow Co. in 1903 (R. 337); that in January, 1904, he drew the designs for the McIlvrid machine (copies of the original drawings of January, 1904, and February, 1904, being in evidence as Defendants' New York Exhibits 98 and 99, p. 58).

He says (R. 338):

> "I was handed by Mr. McIlvrid, who was manager at the time, some rough penciled sketches showing the idea, and in a sketchy way the construction desired, and told to put in shape for construction.
>
> * * * * * * *
>
> "After one or two had been constructed and we found the construction and operation satisfactory enough, we made detailed drawings."

He describes the machines as follows (R. 338-39):

> "The machine consisted essentially of a steel plate cylinder—steel plate horizontal cylinder—with a shaft running through the cylinder longitudinally carrying paddles for the mixing of the material. The shaft passing through stuffing boxes on the heads of the machine to prevent air leakage. There was a dome mounted on the top of the cylinder and an opening in the top of the dome for filling the machine. When it was desired to eject the material from the machine, the door in the top of the charging dome was closed, then compressed air admitted to the cylinder through a pipe opening close to the top of the cylinder. This air pressure forces the door of the charging dome against its seat, giving a tight seal against leakage of air. The air pressure acting on the surface of the material in the cylinder forced the material out through the discharge pipe which entered the cylinder at the bottom—at the bottom of one of the heads—and forced the material to the right location through a hose connected with this outlet pipe just mentioned."

He identifies the machine illustration in the Cockburn Co.'s catalog C (1906), Exhibit 100-a—100-b at page 16 of the catalog.

Mr. Crooks, a subway construction engineer, in his New York deposition (R. 356) testifies to his early use of the McIlvrid machines. He also gives an interesting example of the impelling force of air under compression in actually **blowing a man through the roof of the Pennsylvania Tunnel under the Hudson River and up through twelve feet of muck and twelve feet of water!**

McCormick also used the McIlvrid machine and its British predecessor the Greathead (R. 408) prior to

McMichael, and where the grout or "liquid concrete" was blown out by air pressure on top of the mass, just as by McMichael's top air jet 8.

With these two forms of air jets (pressure jet and ejector jet) so well known, where could there be any possible invention in McMichael using **both** jets in **one** apparatus? Particularly would this absence of invention in McMichael be emphasized where both jets had already been repeatedly combined for identical use and purpose with McMichael (i. e., one jet applying pressure on the mass and the other acting as a booster jet to prevent arching or clogging) as in Duckham (Exhibit 157); (Sickles Exhibit 159), Rix (Exhibit 160), Kolsche (Exhibit 168) (see enlargement), Butler (Exhibit 167). The same principle was exemplified in Harris (Exhibits 164-165).

A MERE MATTER OF DEGREE.

A McILVRID MACHINE WAS BUILT TO HANDLE CONCRETE BY SIMPLY MAKING THE OUTLET PIPE LARGER.

Mr. Le Porte testified (R. 345-6):

"By Mr. Hilliard:

Q. Now referring to this Cockburn Barrow Machine Company catalogue 'C' which is defendant's Exhibit No. 100-B, do you know whether or not the machine shown on page 16 was ever built for mixing and ejecting anything besides grout?

A. **(Witness examines catalogue 'C'). We at one time made on special order one of those machines, standard size and construction, except that the grout outlet pipe was a larger size to permit the passage of stones, the user using it**

for ejecting concrete instead of grout mixture which the machine was designed for.

By Mr. Cox: 3

Objected to as largely incompetent and mere hearsay.

By Mr. Hilliard:

Q. You know that that machine was actually built of your own knowledge?

A. It was.

Q. You saw it made?

A. I did.

Q. Do you recall what the size of the outlet on that machine was?

A. It was either 2½ or 3 inch pipe size.

Q. Was that same order for this special machine ever duplicated?

A. **Not duplicated, but we received a successive order for a machine of exactly the same type and construction in somewhat larger size from the same customer."**

Here is a clear corroboration of all of defendants' witnesses that there is no difference in principle in blowing concrete from blowing grout. All you have to do is to make your conveying pipes larger for concrete than for grout.

For further examples of prior publications on pertinent art and as giving a brief resumè of the more striking examples from the voluminous bibliography on the subject of conveying by compressed air, the Court's attention is directed to the appendix to this brief.

NON-INFRINGEMENT.

Even if the McMichael patent was valid there is no infringement.

As we have already pointed out, the Courts in the Ninth Circuit found as a fact that whatever the **theory** was of the McMichael patent, the Hackley gun was not an infringement.

Not a single witness, anywhere, has ascribed to the Hackley gun the mode of operation claimed for McMichael. On their own theory of infringement plaintiff has failed to make out even a prima facie case.

On this branch of the case Judge Bourquin said (R. 614):

> "The charge of infringement against defendants is predicated upon their use of Hackley's apparatus, patent 1619297 of 1927. This latter is an oblong container, ovoid in cross-section, without upper air pipes, but having four lower air pipes. The discharge pipe is at the bottom and one end, and the disposition of the lower air pipes is entrance at the bottom, pointing towards the discharge pipe, one opening into the entrance of the latter, one opening into the opposite end of the container, and between them, open the other two and equalizing the distances between all of them in order. In operation the container filled, the air is first admitted through the pipe opening in the entrance to the discharge pipe, and thereafter through the others progressively, to the rear as the concrete subsiding in front of them is driven out through the discharge pipe."

Inasmuch as plaintiff emphasizes throughout its brief that the essence of the McMichael patent claims (if valid for any reason) is the use of **one** air pressure on top of the concrete and a secondary air jet in or adjacent to the concrete outlet, and further insists that McMichael, by virtue of the independent action

of these two jets, works on a "slug" principle, it is quite manifest that by the plaintiff's yard-stick, the defendants' apparatus works on a radically different principle from McMichael and, therefore, there could not possibly be any infringement.

Infringement, of course, is never presumed.

The burden of proof of infringement as well as novelty is upon plaintiff.

Mitchell v. Tilghman, 86 U. S. 287; 22 L. Ed. 125;

Price v. Kelly, 154 U. S. 669; 26 L. Ed. 634;

Seymour v. Osborne, 78 U. S. 516; 26 L. Ed. 33.

Proof of infringement must be beyond a reasonable doubt. The nature and exactness of this proof has been well expressed by the Circuit Court of Appeals for the Third Circuit in *Krupp v. Midvale,* 191 Fed. 588, 591.

DEFENDANTS' PATENT RAISES A PRESUMPTION NOT ONLY OF PATENTABLE AND, THEREFORE, SUBSTANTIAL MECHANICAL DIFFERENCE BUT OF NON-INFRINGEMENT.

Corning v. Burden, 15 How. 252, 14 L. Ed. 683;

Boyd v. Janesville Hay Tool Co., 158 U. S. 261, 39 L. Ed. 973;

Kokomo Fence Co. v. Kitselman, 189 U. S. 47 Law. Ed. 689.

A defendant's patent is admitted in evidence for two purposes:

(1) To show the good faith of the defendant;

(2) To show that the expert Examiners in the Patent Office regarded the invention which it covers as essentially distinct from that protected in the earlier patent of plaintiff (III Robinson 306, 307).

Hackley's machine, in fact, bears a much closer resemblance both in appearance and operation to the **Duckham British** patent No. 4400 of 1875, Exhibit 157 (see enlargement), than it does to McMichael.

Judge Bourquin on plaintiff's own grounds finds non-infringement (R. 621):

> "That serves to dispose of the case, and the defense of non-infringement needs no more consideration than to note that Hackley's apparatus is a different combination than McMichael's, has no upright cylindrical hopper bottomed container, is without the U bend, employs no upper air save some incidental back pressure, does not discharge slug fashion as claimed is the invention of McMichael, and so **does not infringe.**"

INVALIDITY OF McMICHAEL CONCLUSIVE.

We submit it is impossible to see any inventive thought in either conception or embodiment of the idea of conveying a fluid, or semi-fluid, plastic substance, like concrete, by compressed air.

We are confident that the teaching of the McMichael patent added nothing to the sum of human knowledge as it existed at the time of McMichael's alleged invention. It was as obvious then as now. Whether one substance or another was to be conveyed by a blast of air was for each individual operator to decide. No inventive thought could be involved in deciding such a question.

If we suppose that everything under the sun, except concrete, had been conveyed by compressed air prior to McMichael, could it be thought that the one who had first decided to try conveying concrete, was an inventor, particularly without any needed change of apparatus or mode of operation over transporting other substances and articles by that method?

And when it appears, as the evidence shows, that concrete itself had been conveyed through pipes and by air pressure, where could there possibly be invention in McMichael?

The case might be different if McMichael had been the first to observe and to realize any new or different mode of operation of concrete over other substance, and had designed new apparatus to fit such new and different mode of operation.

But the only observation he made and the discovery he sets up and was accepted by the New York Courts as a basis for his invention, is an alleged slug action or division of the concrete made into defined sections, each section propelled by an intermediate column of air, as distinguished from conveying dry materials.

But when it is seen that this so-called "slug" or "piston" action was not original with McMichael but was **one of two theories of operation in every air-lift apparatus** prior to McMichael it instantly becomes apparent that the McMichael claim for invention cannot rest on anything so unsubstantial, not to say tenuous.

But as this Court said in *Loom Company v. Higgins*, 105 U. S. 580, in pointing out that an inventor

describing his invention is supposed to begin where the prior art left off:

> "That which is common and well known is as if it were written out in the patent and delineated in the drawings."

SUBSTANTIAL IDENTITY OF RESULT DESIRED TO BE ACCOMPLISHED BY McMICHAEL AND OF RESULTS ACCOMPLISHED IN THE PRIOR ART.

What result did McMichael accomplish that was not already accomplished in the prior art?

Smith in his 1872 patent, patented the very thing, apparatus as well as method, that McMichael 35 years later sought to patent, viz., conveying **concrete by compressed air.**

Smith operated on the **same object** or **material,** for the **same purpose** and with the **same means.** In Smith we have complete anticipation. That being so, what was there left for McMichael to invent after Smith? The answer is absolutely nothing; unless it be his useless U-trap 24 which the practical witnesses on the stand all tell us would, if attempted to be used, render the McMichael apparatus inoperative.

The Patent Office did not cite Smith. Quite obviously they overlooked it. It is so much more pertinent than the art that the Patent Office did cite that we may rest assured they would have cited it if their attention had been called to it and the McMichael patent would never have issued.

Whatever the reason was, this failure to cite Smith correspondingly lessens any presumption in favor of validity that might otherwise attach to McMichael.

Westinghouse v. Toledo Co., 172 Fed. 371 (6 C. C. A.).

Aside from the Smith Concrete Gun, what difference is there in the material intended to be conveyed by McMichael from the Dredge spoils of Duckham or Hussey, or the excavated materials in caisson work, in so far as the fluid constituency, weight, etc., are concerned? It would seem to be that in the old cases it was a mixture of rock, sand, mud and water, while in McMichael it was a mixture of rock, sand, cementitious mud and water. Plaintiff's engineer, Kirkland, on the stand (R. 118) admitted that the addition of **cement** had a **lubricating** effect! Add **cement** to Duckham's or Hussey's material and we would have a concrete gun on such a scale as utterly to dwarf McMichael's efforts.

The McMichael patent has merely a nuisance value to further the speculative schemes of its owners as a means of demanding and collecting tribute by threatening, harassing and hampering legitimate enterprises. It is time the patent was shown up in its true colors and held void.

CONCLUSIONS.

(1) The McMichael patent is void for lack of novelty and invention over Duckham, Kolsche, Canniff, or McIlvrid, or the McCormick use.

(2) It is void for anticipation by Smith (1872); or Sickles (1870); or Kolsche; or Duckham (1875); or Hussey Dredge patents and use.

(3) It is void for prior invention by Leake.

(4) It is void for prior invention by Buzzell & Larkin.

(5) In any event defendant does not infringe because the Hackley patented gun does not use the construction and arrangement of McMichael but works according to plaintiff's own contentions on a different principle and with a different mode of operation.

(6) If the novelty of McMichael depends on the "slug" arrangement, then defendant does not infringe because Hackley does not use that method; and if that distinction is inevitable to plaintiff's patent, the methods of the prior art inevitably have it and the patent is void; in which connection the words of this Honorable Court in *Foley v. United States*, 260 U. S. 667; 67 L. Ed. 451, 455-456, are apt:

> "We need only to say that Gathmann emphasized the distinction of his patents from all that preceded them as using a 'vaporous or vapor-laden atmosphere,' and that such necessarily existed or will occur in the methods used by the government.
>
> "It is counsel's contention that it is 'inevitable that vaporous and vapor-laden atmosphere would be created the instant the heated air came in contact with the green powder, and would continue vaporous and vapor-laden until all of the alcohol and ether were extracted from the powder, or the powder be removed from the drier.' And of this, it is asserted, this court takes judicial notice as 'the law of physics;' and the further

assertion is that: 'Of course, this contract of the heated air with the alcohol and ether caused the air to become vapor laden, whether the defendant wished it or not.' The assertions prove too much. They leave the patents without basis, and the distinction they express and dwell on as merely verbal. If the asserted result was inevitable in the method of the patents, it was inevitable in the method in use prior to the patents; and, we repeat, the patents are left without justification.

"The conclusion, therefore, must be that if the methods of the patents are different from the prior art by reason of the 'initial vapor-laden atmosphere by admitting vapor as steam,' the government does not use it; if that be not its distinction, and the methods of the prior art inevitably have it, the patents are no advance upon that art and are invalid."

San Francisco, California,
February 28, 1929.

Respectfully submitted,

CHAS. E. TOWNSEND,

Attorney for Defendants-Respondents.

(Appendix Follows.)

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Appendix

OTHER COGNATE PATENTS AND PUBLICATIONS.

Prolific as is the art of conveying liquids and semi-liquids by compressed air, we shall refer to only a few of the many pertinent examples.

The following patents should not be overlooked:

GERMAN PATENT TO KOLSCHE. (Defendants' Exhibit 168, p. 657 Exh. Book; See Photostat Enlargement.)

This type of apparatus for sand blasting bears a marked structural resemblance to McMichael.

There are several patents on which the apparatus claims of McMichael read exactly word for word. We refer mainly to German patent to Kolsche, No. 18,394, dated October 16, 1881, particularly as the trial judge appreciated its pertinence as an anticipation.

It employs a closed receptacle to contain the material, and acted by **air pressure on the mass and a syphon air jet in the discharge pipe.**

Its only difference from McMichael is that with it the sand is **dry** or moist while in McMichael the sand is **wet.**

We invite the Court to compare McMichael's claims in suit with this structure and see how apt the language is to it.

The German patent cited above shows everything in the McMichael patent and claims, including the receptacle with the **smooth tapered bottom** (as of claims 21,

22, 34, 35) and the "relatively large" discharge pipe (claim 5) or "relatively extended passageway." (Claim 8.)

Plaintiff's attack on the Kolsche patent simply emphasizes its pertinence as an anticipation as found by Judge Bourquin. Plaintiff gives a translation of the Kolsche specification at pages 100-101 of its brief, for which we are indebted, and shows how faithful a picture this is of McMichael's apparatus. To quote from Kolsche:

> "The receptacle **b** is filled with the material through opening **k**, the cover of the latter is closed, lever mechanism **q n m** is actuated and the main air supply valve in front of **a** and valve **g** opened. The latter is done, so that the same air pressure prevails above the mass to be moved as below it, and so that it will drop unobstructed into the air pipe **d**. Receptacle **b b**^{1} is filled only up to the air passages **g g**^{1}. When the particles drop they are engaged in pipe **d** by the air current and driven through the entire passage."

Regardless of plaintiff's pretentions to the contrary, this latter air jet is a true "velocity jet."

Compare this with the description and illustration of the **McMichael** apparatus as the same appears in the "Engineering News" article of August 10, 1911, reproduced in the McMichael file wrapper (pp. 269-271 Book of Exhibits) and filed in the Patent Office by the attorneys for plaintiff in contending for novelty for McMichael:

> "The chamber (in McMichael; see illustration) has two 1½-in. pipe connections for the admission of compressed air. The horizontal pipe (E) admits air to the top of the chamber, immediately

below the inlet valve. From this pipe is a branch (F) terminating in a horizontal nozzle fitted to the back of the elbow casting. The air is admitted to both points simultaneously, by means of the valve (G). Should it be desirable for any reason to blow air into the pipe only, this can be done by the by-pass (H), the valve (G) then remaining closed.

"The compressed air at 40 to 60 lbs. pressure forces the contents of the chamber down to the elbow (this movement taking only one or two seconds), where it is struck by the horizontal jets," etc.

Concerning Kolsche, Judge Bourquin said:

"The third is **Kolsche's German patent** 18,394 of 1882, for 'apparatus for conveying substances, slack, sandy, or granular material, by means of a current of air.'

"The apparatus is like McMichael's without the U bend; that is, it is an upright cylindrical container, with hopper bottom terminating in a discharge pipe. Compressed air is applied above or behind the material in the container, to force it down and into the discharge pipe, and at that point like air is admitted to assist driving the material through the pipe.

"Without any change, perhaps, save adjustments to circumstances as always, Kolsche's apparatus and method will transport concrete as does McMichael's. Kolsche could rightfully devote it to that analogous use. It follows that McMichael's essentially unchanged application of Kolsche to analogous materials and uses, is not invention. In principle, essential design, function, operation, object and result, Kolsche and McMichael are one and the same. Either reads on the other.

"Kolsche, if later and devoted to concrete, might infringe McMichael, and by the same token, being earlier, he anticipates him.

"The same is true of Duckham, especially in respect to McMichael's application originally, and their common use of the lower air to prevent or relieve packing of the material.

"It must be remembered that the test of 'analogous uses' is not from whence comes and where goes the materials, to what ultimate end or use, or their nature, but in the *method* of conveyance. **Although fertilizer and flour be unlike, and for ends as wide apart as the poles, a wheelbarrow conveying both is devoted to analogous uses, in patent law.**" (Boldface ours.)

BUTLER, NO. 660,946, OCT. 30, 1900.

This patent is a good illustration of the interchangeableness of a **sand** blast and a **water lift,** both employing compressed air for conveying.

The inventor shows and describes both forms. He says:

"The object of my invention is to provide an apparatus operated by compressed air to elevate and discharge sand, water, etc.

"The principal object of my invention is to provide an apparatus for emptying sandboxes of locomotives.

* * * * * * *

"**The particular sand-pump which I have invented could, however, be used for elevating water or other substances, as will be hereinafter described.**"

* * * * * * *

"**Fig. 2 is a similar view of my apparatus as applied to a well.**"

That shows as well as anything could that it did not require invention in McMichaels to adapt the specific showing of the German patent for example, to the blowing of **concrete.**

Plaintiff evidently desires to create the impression that a "pump" is necessarily of the intermittent pulsating or reciprocating type.

The Standard Dictionary defines the noun pump as follows:

> "Pump, (n) (1) a mechanical device for raising, circulating, exhausting, or compressing a fluid by drawing or pressing it through aperatures and pipes. * * *
>
> Pneumatic p. (a pump adapted for compressing, forcing, exhausting or moving air; also one in which a liquid or a semi-solid is transported by the pressure of air or other gas in a closed vessel, forcing it along a pipe). * * * *"

"Flowability" is, of course, as essential in successful pumping by air pressure whether it is water or concrete.

GROUT MACHINES, CONCRETE MACHINES, SAND BLAST MACHINES, PNEUMATIC DREDGERS ARE ALL INTERCHANGEABLE.

This is illustrated in present-day practice in the ready interchangeability of the Hackley (defendants' gun) for shooting grout or shooting concrete—see photograph Exhibits 180 and 182. There is also the testimony that the Canniff machine Exhibit 179 of the San Francisco tests is able to shoot and has actually shot concrete.

These things are conclusive proof of invalidity of McMichael.

Similarly if the McMichael or Hackley guns were to be used in **dredging** operations, it would be necessary only to increase the size of the tank, and instead of a

two-inch pipe as for grout, or a four, six of eight-inch pipe for concrete, one would use a 15 or 18-inch discharge pipe to take larger rocks and great quantities of spoil.

The principle is the same in every case.

GOODRIDGE, NO. 317,337, MAY 5, 1885. (p. 491 Exh. Book.)

METHOD OF REPAIRING WITH BETON OR CONCRETE.

The invention of figs. 1, 2 and 3 is shown as particularly applied to **lining tunnels** and the patent is chiefly interesting in showing a **concrete lined** tunnel as far back as 1885.

GOLDIE PATENTS, 676,128, JUNE 11, 1901. (p. 497 Exh. Book.)
676,129, JUNE 11, 1901. (p. 505 Exh. Book.)

These patents are related, one referring to the apparatus and the other to the matter of injecting liquid cement or wet concrete under railway ties.

The apparatus is somewhat more fully illustrated and described in the 2nd patent.

MOIR, 778,878, JAN. 3, 1905. (p. 519, Exh. Book.)

Application filed July 7, 1904:

APPARATUS FOR FORCING LIME GROUT, CEMENT, OR THE LIKE.

We have already referred to this patent earlier in this brief.

This is a horizontal type of gun quite similar to present day styles. It uses a piston instead of air as an impelling force, although it combines a "hydro-pneumatic action." Some of our present day concrete guns use both the piston and the air.

The patentee Moir says:

> "This invention relates to apparatus which is adapted to facilitate the supply under pressure of lime-grout, liquid cement, or other viscous fluids which have the quality of quickly solidifying for the purpose of filling up vacant space—as, for example, the spaces surrounding the metal sections which forms the lining of tunnels of modern construction."

He then pays tribute to Canniff, McIlvrid, McCormick, Smith and others in the following language:

> "According to the arrangements at present in use for this purpose in tunnel construction a mixing vessel is provided having a cover which is adapted to be opened to receive the materials which compose the grout and to be closed in an air-tight manner after the mixing has been effected. Air under considerable pressure having previously been forced into reservoir by an air-pump driven by an engine or otherwise, a communication is made between the reservoir of air and the upper portion of the mixing-chamber, and the grout is thereby forced through a stop-cock opened for the purpose into a flexible pipe which leads to the place where it is wanted.
>
> Delay in starting the forcing of the grout or any subsequent cessation of the forcing which may occur before the vessel and delivery-pipe are emptied of their contents gives an opportunity for the partial setting of the grout and necessitates the provision of a very considerable pressure in the air-reservoir to overcome the initial resistance on starting or restarting, whereas a

very moderate pressure will in general be sufficient to maintain the flow of grout against the normal working resistance. In consequence of this large, powerful and costly air-pumping appliances are required which are quite incommensurate with the average duty to be performed."

He refers to the hydro-pneumatic action as follows (p. 2, line 22):

"The confined air will interpose itself as a cushion between the hydraulic press and the flowing grout and prevent undue pressure and shock. The operation of forcing the grout will accordingly be due to hydro-pneumatic action.

"At the end of the operation the delivery-pipe can be cleared of its contents by drawing a volume of air or water into the cylinder and discharging it through the delivery-pipe." (p. 2, line 39.)

COMPRESSED AIR IN CAISSON WORK.

Another line of work which is quite similar to McMichael, both in the nature of the materials handled and the principle of operation of apparatus, is in caisson work.

Among leading and very early examples of this in the record are the following:

PNEUMATIC PAINTING.

This was also a well developed art at the time of McMichael. See particularly Saunders' Book (1903), pages 846 to 862, inclusive. (Defendant's Exhibit R, 393 for Identification.)

CHURCH NO. 487,606, DEC. 6, 1892. (p. 623, Exh. Book.)

COATING SURFACES WITH PLASTIC MATERIAL.

This is a Pneumatic Plastering machine.

The patentee says:

> "The invention is designed for the purpose of applying substances in a plastic or approximately-plastic condition to walls, ceilings, or other surfaces."

THE NATURE OF THE MATERIAL.

> "It is essential to my invention that the material be in a soft condition, in which condition it may be forced by an **air-blast or by pressure** directed against the wall or surface which is to be coated. I have found in practice that a good job can be done with an air-pressure of thirty pounds to the square inch. For the best effect I have found that the material should be in a condition a little softer than ordinary plastic material."

He employs a receptacle and air-pressure to force the material from the receptacle through a hose to any desired point.

Exhibit 26: Transactions of the A. S. C. E. July, 1879.

Exhibit 80: Knights Mechanical Dictionary 1873, page 421.

Exhibit 81: Sickles Patent 99,360, Feb. 1, 1870.

Rix Patent: No. 635,270, Oct. 17, 1899, Exhibit 160. (p. 617, Exh. Book.)

Saunders Compressed Air (1903). Defendant's Exhibit for Identification.

Exhibit 33.

Exhibit 26 shows that as far back as 1879 a discussion by Mr. Collingwood in referring to removal of water by compressed air said:

"It is somewhat remarkable that the air pressure was not used also for removing sand and mud, as well as for water."

"The use of a straight pipe without water jet has been found very effective in removing sand, and is certainly more economical when the material is suitable, than the removal by bags."

This article is further interesting as showing the then well known application of compressed air for package conveying.

It is said, page 180:

"When there are boulders, clay or stiff mud, the air can be made to life a cage, acting as a piston in a continuous cylinder which is connected with the atmosphere above (the cage containing the load to be removed). This system is now in successful operation in the Epinac coal basin, in France. Coal is lifted there from a depth of 2000 feet, at a cost considerably less than by the usual method of cables. The miners all ascend and descend by the same apparatus."

Exhibit 80—"Knights' Mechanical Dictionary, 1873" describes and illustrates the Triger method of Caisson sinking.

Exhibit 81, the Sickles Patent is another interesting example of the utilization of compressed air for removing not only water, but **sand, rock** and **gravel** from the interior of a caisson by compressed air.

The same is true of the Rix Patent and the description thereof, in Exhibit 33. See also Sickles Patent 99360, Feb. 1, 1870. (New York Exhibit 81.) Caisson work.

RIX ET AL. 635,270, OCTOBER 17, 1899. (p. 617 Exh. Book.)
DREDGING MACHINERY.

Mr. Rix, one of the inventors, is a distinguished San Francisco engineer who has devoted a lifetime of profitable endeavor in the use of compressed air.

He here utilizes the pneumatic Caisson principle in gold dredging:

He says, p. 1, line 12:

> "This invention relates to subaqueous exploring and excavating in alluvial deposits and over the rock bed beneath in streams, estuaries, bays, or open waters by means of pneumatic or other apparatus."

His invention consists inter alia (p. 1, line 29):

> "means for raising and expelling excavated material by introducing air into the uptake or spoil pipe."

He combines both the "pressure" and the ejector or syphon action of McMichael.

If he encounters **large** rocks too heavy to lift alone by the lighter air pressure he may use a supplemental **water** jet.

PRIOR USES IN ANALOGOUS WORK.

In addition to the foregoing patents and publications defendant found the use of compressed air for conveying various plastic substances analogous to concrete, to have been general and widespread and continuous over many years and in a great number of different localities. Consequently, it was necessary to take depositions at Sulphur, La.; Crowley, La.;

New Orleans, Fla.; Miami, Fla.; New York, N. Y.; Boston, Mass., and Chicago, Ill. A brief résumé of these depositions follow, except as they may have been already covered.

We will take up the Miami depositions first because they refer to the practice of conveying **dredge spoil** by compressed air as in Duckham, supra, only by a somewhat different type of apparatus and on a more gigantic scale.

Mr. Peterson (R. 459) has already told us that **spoil** and **concrete** are quite similar in characteristics when it comes to **consistency** and **mobility.**

MIAMI DEPOSITIONS.

DREDGING BY STEAM PRESSURE.

(Obviously, there is no difference in principle in conveying a fluid or semi-fluid by steam pressure from conveying it by air pressure.)

Philip L. Wilson:

(R. 254):

"I live at 1722 Jefferson Avenue, Miami Beach, Florida. I am a Civil Engineer."

(R. 255):

"I was connected with the Florida East Coast Railway Company from 1904 to 1918."

* * * * * * *

"During the years 1905 and 1906 I had charge of some of the dredges for the Florida East Coast Railway Company which were operated on the Florida Keys.

* * * * * * *

"The object of the dredge work being done at that time was to make embankments or railroad

fills. The nature of the material handled was marl, muck and roots, mostly.

* * * * * * *

"The 'Babcock' and 'Rough Rider' were purchased by the Railway Company from a dredging concern in Georgia. I represented the East Coast at the time the purchase was made. These dredges were towed from Savannah to Miami and later on, down the Keys where they worked at various points. These dredges were purchased by the East Coast Railway Company in 1905."

(R. 255-6):

"The 'Babcock' and 'Rough Rider' are known as vacuum dredges. The first operation, the material to be moved is dug from the bottom of the ocean with a bucket and then deposited into a hopper. From this hopper there is a pipe line to a vertical cylinder about six feet in diameter and 12 feet high. This cylinder is filled with steam. Then water is injected into the cylinder, which condenses the steam and forms a vacuum. A valve is then opened and the material is sucked by the vacuum into the cylinder. This first valve is then closed and live steam under high pressure is let into the top of the cylinder. A second valve is opened and the material is pushed out by the pressure of the steam into a pipe line which runs from the cylinder to the rear end of the dredge, thence through a connecting pipe line to the fill or place where the material is to be deposit.

"At Jewfish Creek the dredge 'Babcock' handled peat, roots and small branches of trees. At Central Supply, which is the opening between Upper and Lower Matacumbe, the dredge 'Rough Rider' handled marl with some shell.

* * * * * * *

"The 'Babcock' carried a fifteen-inch pipe line and the 'Rough Rider' an eighteen-inch.

* * * * * * *

"Marl makes a most excellent roadbed. In general appearance is has a grayish color. After

it has hardened out to a certain extent, it **resembles concrete** or very hard stiff clay."

(R. 257):

"Occasional pieces of rock and conch shells were conveyed with the marl."

CEMENT A LUBRICANT.

(R. 258):

"If you had cement mixed with marl in the way you describe, would that have varied the operation or changed the operation you had?

* * * * * * *

"A. I do not consider that cement would make any difference one way or the other."

(R. 259):

"Many magazines carried articles regarding the construction of the Key West Extension."

WITNESS IDENTIFIES AN ARTICLE IN "THE RAILROAD GAZETTE" FOR APRIL 20, 1906. (MIAMI EXHIBIT 15-A.)

(R. 260-261):

"'A dredge is at work there picking up the peaty bottom of the lake, which is dumped into a hopper and then forced through big pipes supported by pontoon bridges for a quarter of a mile to the point where an embankment for the railroad track across the lake is being built. The only foundation the key offers at this point is mangrove roots. The sections of pipe resting on the pontoons have leather elbows to permit of flexibility. Rattling can be heard in the big pipe as the pieces of coral rock are forced through. Occasionally a large jagged piece of rock will

tear through a leather joint and then the mud spurts.'

* * * * * * *

"I had charge of this particular work and the dredge referred to is the dredge 'Babcock.' The flexible joints were made of rubber instead of leather and only occassionally was there a piece of rock forced through the pipe."

WITNESS IDENTIFIES THE HUSSEY PATENTS AS CORRESPONDING TO THE DREDGERS.

(R. 265):

"L. Hussey No. 526,530 is similar to the plant on the dredges 'Babcock' and 'Rough Rider.' No. 497,427 indicates that this plant is operated by compressed air, while the dredges 'Babcock' and 'Rough Rider' were operated by steam."

(R. 266):

"The drawings are typical of the type of machines used on the dredge 'Babcock' and 'Rough Rider.'"

Capt. Geo. T. Warner (now 73 years old) testified (R. 277):

"I was connected with the Babcock-Lary Dredging Company from 1896 until, I should think, about 1902 or 1903, as I remember."

(R. 278-9):

"The dredge 'Babcock' was built in New York somewhere shortly prior to 1896 and operated for several years on Long Island, New York, and in and about New York. The dredge 'Rough Rider' was built at Massena, New York, did some work up there, which I had nothing to do with, was then brought down to New York and later on

brought to Savannah, Georgia. Both dredges, the 'Babcock' and 'Rough Rider,' were under my control in Savannah, Georgia. They were used in the river to build the Seaboard Air Line Terminal—freight terminal—and we built three slips into the marsh with those two dredges, principally the 'Babcock.' The first slip was 1500 feet long; that is, from the river bank; the second slip was 1000 feet long, and the third slip was 800 feet long. Each of them was about 200 feet wide. The river we widened opposite the City of Savannah 135 feet, I think—as well as I can remember, 27 years ago. 1899 we commenced work and I think we finished that work there in 1902.

* * * "at Savannah * * * the 'Babcock' had one vacuum pump. The 'Rough Rider' had two. The 'Rough Rider' was built with the intention of using the pumps alternately; while one pump was being emptied, the other would be filling. We found that didn't work first rate, so we only used one pump on the 'Rough Rider.' The 'Babcock' was used with one pump altogether.

"We handled everything under the sun with the 'Babcock' at Savannah. We picked up skulls, Spanish money, buttons off the coats of Revolutionary British soldiers, rock, sand, everything else—watches—everything we found in that pump. The river and these slips that we dug in were on an old rice field opposite the City of Savannah—that the British soldiers were in camp during the Revolutionary War, and it was the remains that a great many of the old camps left there that were disturbed. We dug up a number of wrecks and of old British gunboats. We recovered old British muskets which fell to pieces with the rust when we picked them up. We picked up old cannon and almost everything that you can name.

"The 'Babcock' had a 15-inch discharge pipe and the 'Rough Rider' an 18-inch discharge pipe. We could not put everything through the 'Bab-

> cock' pipe of 15 inches that was anywhere from six to eight or ten inches. I did know of some pieces of rock going through that were **twelve inches in diameter.**
>
> * * * * * * *
>
> "Savannah was a naval stores port. Foreign vessels would come in there for the purpose of loading with naval stores. They would come in ballast. That ballast was thrown out largely at the point where we dug Slip Three, and it was said that a man of any nation could go ashore on that dump and stand on his native soil, meaning, in other words, that vessels from all over the world came there and loaded naval stores."

This accords with the published articles in periodicals of the time.

Exhibit 121: "Engineering News," June 13, 1895, page 378.

Exhibit 122: "Engineering News," June 13, 1895, pages 384-7.

Exhibit 123: "Engineering Record," Jan. 6, 1900.

Exhibit 124: "Transactions of A. S. C. E.," Jan. 1894, pages 70-71.

Exhibit 125: "Transactions A. S. C. E.," May 1894, pages 492-3.

The first of these exhibits relates to the Hussey delivery dredge such as shown in the Hussey patents in evidence and referred to by the Miami witnesses and described by the Miami witnesses, and the other articles relate to similar operations of pneumatic dredges, but they may be considered together.

They all go to show the force and power of air under compression for the moving of any mobile substance that it can get behind or come in contact with.

Exhibit 121 gives an admirable illustration of the Hussey dredge and its mode of operation.

The article says, page 380:

> "At the time of our visit the length of discharge pipe was about 2500 feet and the dredge was handling **about 500 cu. yds. per hour.** * * * The material being handled was composed of **sand, gravel and mud,** about 70% being sand and the discharge from the delivery pipe approximates about **50% of solid** and 50% water."

MATERIAL MORE DIFFICULT OF HANDLING THAN CONCRETE.

It refers to Babcock, Lary & Co. builders. Continuing:

> * * * "at Orange Lake, Newburg, N. Y., where the material was **transported 2,500 feet in 15-in. pipes,** reaching an **elevation of 44 ft.,** the material as delivered containing approximately about **75% solid** and 25% water. The same dredge has for a year past been doing successful and satisfactory work in handling pure sand at Bergen Beach, N. Y. The dredge referred to in this article was constructed later, and did its first work at Rye, N. Y., where it was required to handle **gravel, stiff clay, sand and stones** which **could scarcely pass through an 18-in. pipe,** delivering these materials through 1035 ft. of pipe and raising them 25 ft. in this distance. **One of the many large stones was 16x21x10 ins., and was forced through with a pressure of 12 lbs. of steam. Large stones** and other heavy articles can be passed without injury to the pipes."

In Exhibit 124, in referring to vacuum steam pressure pumps and dredges of the sort used in reclaiming the Potomac Flats, it is said, page 71:

> "The ability of this pump to handle heavy objects was demonstrated on two occasions; **at one time a stone, supposed to be a buoy anchor, weighing 1300 lbs., and at another time, an iron safe, 25x16x14 ins.**, were forced through it."

Certainly if the apparatus could handle stuff like this the blowing of ordinary concrete would be mere child's play.

In Exhibit 125 there is a discussion of dredging operations in 1894. The operation is succinctly given as follows:

> "The operation was this: The bucket lifted the material into the bin, the vacuum was formed in the usual manner, the inlet gate was lifted, and the charge filled the chamber. Then the inlet gate was shut, the outlet gate was opened, steam was let in, and the muck was driven to the dumps. **The material was almost wholly muck, varying from a consistency of peat to light, fibrous material.**"

DEPOSITIONS AT SULPHUR, LA., (R. 155-197).

These depositions had to do with the subject-matter of the once famous litigation over the Frasch patents —*Union Sulphur Co. v. Freeport & Texas Co.*, 255 Fed. 963 (3 C. C. A.).

Sulphur is a very difficult substance to deal with. It begins to liquify only when heated to a temperature above boiling water around 250° F., while if it is heated to over 313° F. it begins to become pasty so that it will not flow. Consequently, piping sulphur through long lines, particularly by means of air

pressure, the sulphur must be kept within a narrow range of high temperatures.

Melted sulphur is twice the weight of water.

CONVEYING MOLTEN SULPHUR BY COMPRESSED AIR.
FRASCH NO. 799,642, SEPT. 19, 1905.
(Application filed May 27, 1897.)
NO. 800,127, SEPT. 19, 1905.
(Application filed Nov. 23, 1903.)

These patents are outstanding examples of the handling of a heavy, viscuous substance far more difficult than concrete, by compressed air. The litigation over these patents makes them doubly significant in connection with the present suit.

Union Sulphur Co. v. Freeport & Texas Co.,
255 Fed. 963 (3 C. C. C. A.),

where these patents, despite their wonderful contribution to the industry, were held invalid in this very **air conveyor feature!**

Mr. Keever, vice-president of the Union Sulphur Co., tells us molten sulphur was pumped from a depth of from 500 to 1400 feet. (R. 158.)

COMPRESSED AIR THE ONLY PRACTICAL METHOD.

Mr. Keever further testifies (R. 165):

"Q. What method was used to bring all this sulphur to the ground?

A. The compressed air method.

Q. What other practical method, aside from the compressed air method has been used by the Union Sulphur Company to bring sulphur to the ground?

A. There was no other practical method.

Q. Do you know of any other practical method used by any other company?

A. I do not; I know that the Freeport-Texas Company are using compressed air in their wells."

DIFFICULTIES OF HANDLING SULPHUR.

Mr. Keever testifies (R. 166):

"Q. Is sulphur easier to convey or lift by compressed air than water, or any other substance you know of, or is it harder?

A. It is harder to convey than water because it is heavier, but if sulphur is kept at the right temperature, I can see that it can be no easier or harder than other flowing substances of like density or specific gravity."

The magnitude of these sulphur pumping operations by compressed air is shown by the number of wells pumped prior to 1907, and the millions of tons of sulphur so handled could be handled or recovered by no other known method.

"SLUG" OR "PISTON" ACTION ALWAYS PRESENT IN PUMPING SULPHUR.

Mr. Keever thus refers to the "piston-action" of pumping sulphur:

"A. It comes out intermittently, by gushes, slugs, or pulsations.

They vary from seven or eight up to twenty-eight per minute. It depends on the amount of sulphur that the well is producing." (R. 169.)

"A. It always came, so far as I have been able to observe, in the same way, in pulsations. * * *

Where a well was only making a few gushes, from ten to fifteen, it would be pumping a very small quantity of sulphur, but if it pumped up to twenty-eight gushes per minute, it would make from five to six hundred tons in twenty-four hours."

Mr. Maxwell says (R. 189):

"A. It is nothing more or less than a gush of sulphur, and that is gauged by the volume of air coming up through the three-inch pipe with sulphur."

(R. 181):

"Q. Who was the man who first used compressed air to produce sulphur, as far as you know?

A. Herman Frasch.

Q. And you yourself have used it since coming to the Sulphur Mines?

A. Since 1902; were using compressed air when I came here in 1902. I was here in 1902 and 1903 and saw the compressor running."

Again Mr. Maxwell says (R. 187):

"My earliest experience in observing the pumping of wells by compressed air was in May, 1903. The sulphur came out of the ground from these wells in liquid form, coming out in gushes or slugs, I would call them. I first observed this pulsating action of the sulphur coming out in gushes in May, 1903. There was no difference at all in the way in which the sulphur came out of the ground in 1903 and 1907, or even later on. Compressed air was used in both years."

Mr. Keever says they also pumped mud and water and with the mud they also noted the **gushing action** (R. 178-9).

Only Necessary to Add Cement to Make Concrete.

Mr. Maxwell testified (R. 193):

"RDQ. You testified that you saw them pump sand, water and gravel by compressed air, what would you have to add to that to make concrete?
A. Cement."

FRIZELL AND POHLE METHODS CONTRASTED.

It might be here explained that as early as 1890 there were two well-known methods of lifting and conveying liquids and semi-liquids by compressed air, commonly referred to as the "air-life" method of pumping. According to one method (the "Frizell method") see Frizell patent of 1880,* (R. 367), the air was mingled with the liquid in the form of minute bubbles so as to form a **foam,** or column of mingled air and liquid of diminishing density, so light that it would be raised by the available pressure in the ground.

According to the other, or "Pohle method," the air was injected in bulk so as to form a series of **pistons** ("slugs") alternating with **pistons** of liquid. This Pohle or **piston** ("slug") method is described in the Pohle patent No. 487,639, which is reproduced (p. 565 Exh. Bk.)

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*Frizell, No. 233,499, Oct. 19, 1888. (Deft's Exh. 163 p. 636 Exh. Bk.) This early patent is generally taken as the leading exponent of the aeration method of raising liquids or semi-liquids by compressed air. The invention is aptly expressed in his claim: "In the art of elevating water, the method of causing a column of water to ascend in a conductor by the weight of the external water, which consists in introducing a tube of the desired length at the required depth into the water to be elevated, and then injecting compressed air in the form of minute bubbles into the water at the lower end of said tube, thereby aerating the water, whereby a continuous stream is caused to flow upward to the point of discharge, substantially as described."

The Frasch sulphur patents represented a combination of both ideas. **These Frasch patents although they wrought a revolution in deep sulphur mining, were nevertheless held void for lack of invention.**

CROWLEY, LA., DEPOSITIONS (R. 197-218).

These depositions were of leading citizens of the community and pertain to early practical work in lifting and conveying sand and water, oil, etc., by compressed air. It was as to work similar to that testified to by Mr. Ivens, supra.

The first witness was Mr. H. J. Landers, vice-president of the Acadia Iron Works, who has lived in that community for about 34 years. He stated that in about 1895 or 1896 he was engaged in rice farming down in Vermilion Parish, and that he decided to put in a deep well and raise or pump water by compressed air (R. 198).

The witness says (R. 198-99):

> "After our well caved in on us it was useless and we disposed of it to the **Crowley Brick Company,** I believe it was * * * It was pumping sand the same as it pumped water. They used the same principle, **compressed air forced the sand to the top and lifted the sand out."**

(R. 200):

> "The sand came out of the same size pipe as the water, about an eight-inch pipe."

The next witness is Mr. John Green, Wholesale Grain Merchant, who was a director of the Crowley

Brick Company which had a short existence from about 1901 or 1902 to 1904. Concerning the consistency of the material pumped, Mr. Green testified, on cross-examination (R. 205):

> "Why I would say it was at least **seventy-five per cent sand. It seemed to be almost solid sand just running out of the pipe. There was water mixed with it.** It was so much sand it would kind of pile up,—if there had been so very much water it would have washed away."

The next witness was Mr. J. G. Medlenka. He is 57 years of age, a lawyer by profession, and was **President of the Crowley Brick Company** during its existence. Concerning the use of air for conveying sand, water and gravel, Mr. Medlenka testified (R. 208):

> " * * * The idea was to have the sand and gravel flow into the end of the casing and as it flowed it was pumped out by the compressor. Of course, **water, sand and gravel** came in together.
>
> * * * * * * *
>
> "* * * This **sand and gravel, together with water, was forced to the surface** and at the top there was an elbow on the end of the pipe that shoved it out on the land away from the derrick."

Mr. Jack Frankel, president of the Bank of Acadia and of several other institutions, is 65 years of age and has been in Acadia ever since the town started 40 years ago. He was a director of the Crowley Brick Company in 1902-1903.

Speaking of the consistency of the sand, gravel and water he says (R. 217):

> **"It came out in mulsified form,—a pretty thick liquid."**

(R. 218):

"No sir, **the sand was mulsified very strongly with the water. It was pretty thick.** It came out in gushes acting on the impulses of the machine."

DEPOSITION OF EDMUND M. IVENS, NEW ORLEANS, TAKEN SEPTEMBER 1, 1927, A NOTED ENGINEER IN WATER LIFT WORK.

Mr. Ivens is one of the most distinguished living authorities on the use of compressed air for moving liquid. A text-book of his is in evidence as defendant's New Orleans Exhibit 12 (R. 251) entitled "Pumping by Compressed Air" (1914). Also author of a number of technical papers on the subject (R. 221-222). Mr. Ivens shows his qualifications and experience in a great many different industries and instances. He also refers to his experience with apparatus of the type shown in the Harris patent, No. 814,601, and of which Harris patent he made a drawing which is in evidence as defendant's New Orleans Exhibit 9 (R. 235), **wherein the air chamber in the well is sealed so that an air pressure could be created on top of the water in the well; and in addition thereto there was a jet of air or booster jet at the bottom to aid in ejecting the liquid.** Thus there was **a combination of the two air pressures or air jets just as in the McMichael patent.**

Mr. Ivens shows that the pressure on top of the material in a closed receptacle (as in McMichael) is the counterpart of the hydrostatic head of the water column surrounding the discharge pipe of an air lift.

WIDE VARIETY AND USE OF AIR LIFT.

Mr. Ivens testifies (R. 246-247):

"Q. To what extent is the system of pumping by compressed air used, both in this region and elsewhere?

A. Very largely used in such industries as ice plants, waterworks plants, electric light plants, sawmills, sugar factories, oil refineries, hotels, office buildings, and in almost every industry located inland where surface waters are not available.

* * * * * * *

"A. In this locality, air lift is used in elevating **water, oil, sulphur,** and, in some instances, **solids** like grain."

NO DIFFERENCE IN ACTION WHATEVER THE MATERIAL.

(R. 250):

"Q. State what difference there would be in the operation as previously described by you, in the case of sand and gravel?

A. There would be no difference in the actual operation of the air lift."

On cross-examination Ivens testified (R. 252-53):

"A. The largest percentage of sand pumped with fluid was in oil wells, and, of course, there is a wide variation. I have seen possibly as high as **eighty to ninety per cent** sand handled in fluids."

ABSTRACT OF EXHIBIT PUBLICATIONS.

EXHIBIT 20: Engineering Record, Oct. 20, 1906.

EXHIBIT 21: Penna. R. R. Gazette, April 20, 1916.

EXHIBIT 22: Engineering-Contracting, Oct. 16, 1907.

EXHIBIT 23: Scientific American, May 18, 1907.

EXHIBIT 24: "The Railway Age," April 19, 1907.

These exhibits all have reference to the building and progress of work on the Key West extension of the Florida East Coast Railway testified to by the Miami witnesses.

Certain of these articles refer to the use of the pneumatic dredgers by which the marl or coral rock and water was forced by steam pressure long distances through pipes; and shows the advantage of these types of dredgers over the suction and other types of dredgers.

These articles indicate not only the magnitude, but the tremendous difficulties of the job.

In Exhibit 22, page 633, it says:

> "The coral rock on which a considerable portion of the roadbed is based, makes an excellent foundation, the same material crushed affords excellent ballast. As before stated, this crushed coral becomes as hard as rock, after exposure."

PNEUMATIC SEWAGE SYSTEM.

EXHIBIT 27: "Transactions of the A. S. C. E., Dec. 1892, pages 659-666"—

showing and illustrating a method of conveying sewage by air pressure.

The principle and mode of operation are well illustrated on pages 662 and 663.

> "The compressed air thus automatically admitted into the injector presses on the surface of the sewage, driving the whole of the contents

before it through the bell mouth opening at the bottom and through the outlet pipe B into the iron sewage discharge pipe or high level gravitation sewer, as the case may be."

The apparatus illustrated in section is not so unlike the McMichael device.

GROUTING BY COMPRESSED AIR.

EXHIBIT 28: Proceedings of the S. C. E., 1896.

EXHIBIT 52: Engineering News, Oct. 11, 1906.

EXHIBIT 53: French "Revue Generale," pages 529, 539 (1906).

EXHIBIT 55: Engineering News, Nov., 1909.

EXHIBIT 56: French Revue Genrale, March, 1909, pages 171-174.

EXHIBIT 58: "Zentralblatt," Feb. 21, 1891, pages 73-75, and Feb. 28, 1891, pages 84-85.

EXHIBIT 62: German "Zentralblatt," Oct. 17, 1903, pages 517-518.

EXHIBIT 82: Copperthwait, 1905, pages 94-5.

EXHIBIT 83: Caniff Patent No. 873,345.

EXHIBIT 88: McIlvrid Patent No. 95,421, May 17, 1910.

EXHIBIT 89: Boston Tunnel, May, 1902.

EXHIBIT 90: Belmont Tunnel, N. Y.

EXHIBIT 92: Engineering Record for June, 1907.

EXHIBIT 100: Cockburn Barrow Co., Catalogue C, 1905.

EXHIBIT 103: Transactions of A. S. C. E., Sept., 1910 (Pennsylvania Tunnel McIlvrid Machine).

In EXHIBIT 28, of 1895, and EXHIBIT 82 of 1905, the work of the distinguished engineer, Greathead in the use of grouting by compressed air is described at some length.

The first exhibit refers to the added advantage of tunnel ventilation where compressed air grouting was used.

EXHIBIT 82 describes further and illustrates the Greathead grouting pan which latter in many ways foreshadows the American patent of McIlvrid.

Greathead's British Patent is No. 5221/1886.

EXHIBIT 103 illustrates the mode of use of a McIlvrid machine as practiced in Pennsylvania tunnels.

EXHIBIT 33: March, 1898, page 403.

Compressed Air Dredger for Gold Mining:

This is a description of the Rix & Donahoo patented machine. It handles material very similar to concrete pipe and very similar to the McMichael Method by compressed air.

Thus the writer says:

> "In general, as shown above, these machines are iron caissons, which can be raised or lowered through the center of a boat or barge, the water being expelled by the proper pressure of compressed air. The bottom is thus exposed to the direct manipulation of the miner who is within

the caisson, and he picks or otherwise loosens up the earth or gravel on the bottom and sends it to the surface through the small internal discharge pipe, either by direct air or water pressure as he desires. * * * No bad effects upon the operator are produced as the pressure is moderate and invigorates rather than depresses the worker."

"Men work in caissons at 25 to 30 pounds pressure per square inch, which corresponds to 60 or 70 of water pressure."

"The machine is intended for such rivers as the Yukon and is manufactured by Rix & Donahoo, San Francisco."

EXHIBIT 34: January, 1902, pages 1655 to 1659: Discussion of the Pohle Air Lift System in pumping water at the Government Hospital, District of Columbia, from a depth of from 200 to 300 feet, using Ingersoll-Sergeant compressors.

On page 1658 is another article on the use of the air lift describing its various other applications. Thus:

"In addition to its use for raising water, compressed air lends itself with remarkable facility to the difficulties involved in handling brine from salt wells, for raising sulphuric acid, acid solutions, and other commercial liquids of high specific gravity and corrosive character. In manufacturing establishments, it is indispensable for ore leaching, handling dye, paper, pulp and fluids. In sugar refineries or any place where gritty particles and chemical solutions are encountered and for many other purposes which will suggest themselves the Air Lift has no equal."

EXHIBIT 35: Vol. 7, 1902, pages 1941-2-3:

An article entitled "Removing Sand from Wells by Compressed Air."

The article says:

> "The idea of this was not only to blow the sand out of the well by stirring it up and carrying it off by the large flow of water due to the action of the air lift, but also to make such action sufficiently violent to knock any rust off the perforations. * * * The result of this was to bring up a steady stream of water containing much sand and large pieces of rust. * * *"

On page 1943 is a picture of the well blowing out sand and apparently large rock.

EXHIBIT 36: March, 1903; September, 1903; October, 1903.

These cover articles on conveying sewage by pneumatic pressure and on conveying tailings, sand, cyanide concentrates, etc., in mining.

On the elevation of tailings the author said:

> "The rising main was a 4-inch black pipe with air inlet through 1-inch pipe. This elevator was capable of lifting tons of tailings in 24 hours. The most wear was shown on the top bend which has a life of about six months. In the rest of the pipe the wear was normal."

EXHIBIT 37: January, 1904, pages 2723, 2735.

This is an extended article on the raising of water with compressed air, being a reproduction from the "Engineering Times," London.

It describes the various apparatuses and uses, including the displacement pumps, the Frizell bubble method shown in the Frizell 1878 patent, and the Pohle method of slugs or pistons here claimed as new by plaintiff and refers to the distinguished Dr. Siemen's work in the air lift pump line, and also refers to various publications in German and French on the subject.

It quotes an earlier authority as follows:

> "The mixture of air and water in a vertical pipe forms a kind of froth having a less density than water, thus allowing it to be raised to the surface where it flows out."

EXHIBIT 38: May, 1904, pages 2911 to 2922.

This article gives any number of uses that compressed air was being put to as early as May, 1904, in lifting and conveying various substances.

Among other things it refers to the sand blast, to painting by compressed air, lifting water, etc.

EXHIBIT 39: June, 1904.

Here we find one of the earliest descriptions of the McIlvrid grout mixer.

This is a horizontal type of machine—shown in the McIlvrid patent, and has been in extensive use for the past 23 years.

The mixture used was 3 bags of cement, 3 bags of crusher dust mixed with a suitable quantity of water.

After mixing "air pressure of 90 pounds is admitted to the cylinder and forces the grout through a 2-inch outlet in the bottom and a flexible hose connected with the 1¼-inch hole in the tunnel shell."

EXHIBIT 40: January, 1905, page 3320.

An article on the use of compressed air for painting.

EXHIBIT 41: February, 1905, pages 3347 to 3349.

An article descriptive of an air-lift pump of the Pohle piston or pulsating type.

Refers to the difficulties Mr. Pohle had in convincing the Patent Office of the novelty of his theory, and also refers to an article by Mr. E. A. Rix describing the pump in the Journal of the A. E. S., Oct., 1901, page 201.

EXHIBIT 42: December, 1905, pages 3792-3796.

This is an article on the pumping of wet sand by compressed air.

Considering the operation, the article says:

> "A constant flow of water which enters the pit on all sides * * * is collected in a sump * * * and the mixture of sand and water is directed into a box beside the main pump. From the sump the sand and water are delivered into a tank * * *. The sand and water (in the tank) is discharged by compressed air * * * through the delivery pipe * * * the sand mixture varies in quantity from 5 per cent of sand to 65 per cent by weight. The average performance of

the pump is 50 tons of sand alone raised per hour or 500 tons of sand per 10-hour day."

On page 3795 the article says:

"the introduction of this pneumatic system of pumping in the pit has been the solution of a serious problem which was confronting all sand producers of that section."

EXHIBIT 43: February, 1906, page 3897.

This illustrates a compressed air white-washing machine.

The article says that the machine "accomplishes in two hours the amount of work that can keep one man busy a month."

EXHIBIT 44: September, 1903.

This article describes a pneumatic tamping device that has been put in practice on the Erie Railroad and refers to its earlier use on the Chicago N. W. and N. Y., New Haven.

The method here shown apparently differs from the Goldie patented method of using wet concrete as apparently it refers only to blowing broken slags.

The article says:

"The ballast used was broken slag. In surfacing the track the desired end was secured by blowing pulverized slag in the ends of the ties to fill the space caused by lifting the rail to grade. * * * The idea of tamping tracks by blowing fine gravel or other material under ties with an air blast is by no means new."

Note: This was as early as September, 1903, the date of the article.

EXHIBIT 45: April, 1903.

This describes several new blast machines employing both the syphon jet and the pressure jet singly or combined, just as in McMichael.

EXHIBIT 46: June, 1897, page 234.

This describes a Ballast Injector quite similar to that described in Exhibit 44. It employs a hopper and flexible hose and a blower and a "double tubed injector."

EXHIBIT 47: June, 1896, Vol. 1, No. 4, page 3.

Referring to the then recent St. Louis tornado the article says:

> "Perhaps the most impressive evidence of the storm's force is shown in the wrench given to the eastern end of the Eads bridge. There the tornado dealt with stone masonry. It tore off and tumbled down tons upon tons of this masonry. Beginning with the big eastern pier and extending to the foot of the incline, the tornado cut off the upper part of the structure as if it had been of flimsy trestle work.
>
> What power is this which is exhibited with such marvelous intensity? * * * The power of air exerted in this mysterious manner indicates that there is something unknown in this line which has not yet been properly defined."

EXHIBIT 50: June, 1907, pages 4490-4491.

This is an article on sand blast on high and low pressure type and illustrates a structure almost iden-

tical in construction with the Ransom-Caniff concrete placer in using a blast on top of material in the tank and a syphon jet at the bottom. The only thing needed to make it a McMichael-Ransom-Caniff gun is to increase the size of the device.

COMPRESSED AIR FOR INJECTING CEMENT INTO QUICK-SANDS AND FOR CONSOLIDATING FOUNDATIONS.

EXHIBIT 51: Engineering Record, March 29, 1913—Grouting a Fissured Foundation in the Carson River, Nevada Country.

EXHIBIT 62: "Zentralblatt," 1903.

EXHIBIT 63: Translation of Exhibit 62.

EXHIBIT 106: Transactions of the A. S. C. E., Sept., 1893, by Neukirch.

EXHIBIT 109: Transactions of the A. S. C. E., Dec., 1893, "Subaqueous Foundations," by Neukirch.

EXHIBIT 115: Engineering News, Sept. 15, 1895, Pohle 163: "A New Method for Securing Foundations."

EXHIBIT 116: French publication, "Le Genie Civil," Sept. 21, 1895, page 327.

EXHIBIT 117: Translation of Exhibit 116.

EXHIBIT 118: French publication, "Le Genie Civil," Dec. 29, 1900, page 145.

EXHIBIT 119: Translation of Exhibit 118.

Due service and receipt of a copy of the within is hereby admitted

this..... day of February, 1929.

.....

.....

Attorneys for Plaintiff-Petitioner

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In the Supreme Court
OF THE
United States

OCTOBER TERM, 1930

No. 4

CONCRETE MIXING & CONVEYING COMPANY
(a corporation),
Petitioner,

vs.

R. C. STORRIE & COMPANY
(a partnership),
Respondent.

DEFENDANT'S-RESPONDENT'S REPLY MEMORANDUM.

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PERNAU-WALSH PRINTING CO., SAN FRANCISCO

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DEFENDANT'S-RESPONDENT'S REPLY MEMORANDUM.

This brief is filed by leave of Court first had and obtained.

At the conclusion of the first argument of this case before this Honorable Court in April, 1929, petitioner was granted leave to submit its "Reply Brief for Plaintiff-Petitioner" (28 pages).

Subsequently respondent and its counsel discovered that it contained a number of inexcusable misstate-

ments of evidence and facts which if allowed to go unchallenged, now that the case is resubmitted, may mislead the Court.

The erroneous statements of petitioner, to which exception is noted, occur on pages 17 and 18 of petitioner's said Reply Brief, and appear to be deliberate misrepresentations of what took place at the San Francisco tests of the Smith Gun, discussed at length in our opening brief (pages 125-132, inc.).

I.

Plaintiff-petitioner says (page 17, Reply Brief):

> "The material was forced only a short distance; it was a liquid mixture (which will not make concrete) and only a very small aggregate was used. (R. pp. 447-9 and 465.)"

Pages 447-9 refer to the identification by Mr. Wilkins of motion picture films taken by him, Exhibits 190-191-192, to which we invite the Court's attention.

Page 465 of the record, cited by petitioner, concerns the tests on both the Smith and Camniff machines.

As to the exact nature of the concrete which was actually blown through the **Smith** gun, the Court has only to look at the sample in evidence of the **Smith** mix, Exhibit 193, and compare it with the standard present day mix, shown by sample, **Exh. 194, such as was being used in the Sunset Tunnel with the Hackley gun** at that time and where the tests took place.

The "small aggregate" referred to was used with the **Canniff Grout Gun,** and **not** with the **Smith Concrete Gun.** (R. p. 465.)

The **Canniff** tests required "small aggregate" with concrete because the gun had only a 2-inch discharge pipe (the size of the pipe being the only limit to the size of the aggregate).*

The only reference to a concrete gun containing small size aggregate is in connection with the **Canniff Gun,** where Peterson says (R. p. 465):

> "Q. Then what did you do with the Canniff gun?
>
> A. With the Canniff gun—I should say with the Canniff gun we blew air through and then we blew an ordinary grout mixture with the Canniff gun with a grout mix of one part cement and two parts sand, and then we blew a concrete mix consisting of—with rock of the maximum size of one inch.
>
> Q. Did those tests satisfy you as to the practicability or otherwise of the Smith gun as a gun to shoot concrete?
>
> A. Yes, sir. I would say—I would use it on a large job. I would make a bigger gun but just the same type. The principle was satisfactory. It showed that it had the proper structure or proper general proportions and features to shoot concrete. That was what we were interested in doing."

The reference to Smith R. 465 (testimony of O. W. Peterson), is as follows:

---

*Down in Florida, with an 18-inch discharge pipe they conveyed rocks from 12 to 16 inches in diameter, and at one time conveyed a stone weighing 1300 pounds; and at another time an iron safe, 25 x 16 x 14 inches! (Our Opening Brief, Appendix, pp. 17-19.)

"A. We used first a grout of one part cement and two parts sand mixture. We then used the Smith formula mix of one part cement and one part sand and three parts rock; the parts being by weight and then we did three shifts (fifths) of the volume by water. That was the mix used as nearly as we could duplicate those conditions.

Q. Was a shot of water run through the machine first?

A. Well, we washed the machine first before we started, to be sure that there was no obstruction of any kind of that sort. As far as that goes, first of all we applied air through and then we applied water and then the grout and then the concrete mixture."

II.

Petitioner's next error is still more serious: Counsel say page 17 of said brief:

"(e) But respondents' witnesses, in order to make a seemingly plausible test went far beyond the Smith patent and used a tank 'two-thirds full of water' (Hackley, R. p. 439). This made the mixture, even if the tank were entirely filled, 66% water. This is not only an absurdity, but a fraud, and the statements of the witnesses that this was a concrete test or a test with the Smith mixture (Peterson, R. p. 465), are palpably deceptive."

"The foregoing demonstrates three things, to-wit:

* * * * * * *

2. That to support the utterly inadequate showing of the patent they felt obliged to resort to tests using a mixture having an absurd proportion of water."

That is strong language.

The record does not uphold it.

Neither Mr. Hackley nor any other witness said nor implied that the Smith mix as used at the tests, was two-thirds water. What Mr. Hackley did say concerning the Smith test is this, beginning R. 429:

> "A. They (photographs Exhibits 184 and 185) represent a machine built for the purpose of shooting concrete through a pipe. The discharge pipe is a **four-inch pipe** with a **four-inch valve** on it directly under this container. On top there is a two-inch and a quarter air connection. The air was let into the chamber under a 100-pound pressure. On the side was an opening for filling concrete or materials to be discharged from the pipe. **We first filled that container with water and turned on the air and opened the valve** at the bottom after plugging the inlets—the charging opened the valve at the bottom and the water was **discharged through the pipe.** * * *
>
> "I might say that the end of that discharge pipe was about thirty feet from the machine and at an elevation of about twenty feet above it. **After shooting the water out, we filled the container with concrete and shot that out in the same manner. We then used concrete**—mixed concrete with **rock up to an inch and a half in size** of two different consistencies or **two different mixtures and that** was discharged in a continuous stream in the same way. * * *
>
> "The first mixture by weight—one of cement and one of sand and three of rock. The second mixture, one of cement, two and a quarter of sand and about four and three-quarters of rock." (Boldface ours.)

Smith's machine is in evidence as defendant's Exhibit 186.

In short, what happened was that the tank was first filled two-thirds full of water **and the water then blown through the discharge pipe to lubricate the latter before the concrete was put in at all.** That is always done with every concrete machine, before starting operations.

The testimony of Mr. Hackley on cross-examination (R. 439) is consistent with the foregoing and does not support petitioner's serious (and obviously reckless and false) charge of fraud.*

Mr. Peterson's testimony, to which petitioners have the temerity to refer, entirely supports Mr. Hackley and the facts in connection with said tests. To quote Mr. Peterson, R. 466:

* * * * * * *

> "A. We have here one sample which is marked here 'Mix one, one, three, Smith patent mix.' I marked my initials on it, 'O. W. P. September 7, 1927.' There was no particular pains taken to preserve the character of the concrete. We just wanted to get a sample of the materials used. (Exhibit 193.)
>
> * * * * * * *
>
> "We have here sample No. 2, marked 'Rock mix, one, two and a quarter, four and three-quarters referring to the cement, sand and rock, 'O. W. P.

*Mr. Hackley on cross-examination (R. pp. 439-40) testified, in part as follows:

"Q. If I understand you, you had a tank here and how much water did you put in there?

A. About ⅔ full.

* * * * * * *

Q. Then you applied air under pressure to the top of that tank by an inch and a quarter pipe?

A. That is correct.

* * * * * * *

Q. Now, did the pressure acting on the surface of **that water** force that water down through that pipe in a solid stream, filling the discharge pipe?

A. **It mixed with the water as it went out."** (Boldface ours.)

> September 7, 1927.' These were samples obtained from materials which were put through the Smith Gun at the Sunset Tunnel on September 7th. (Exhibit 194.)"

The above testimony from the record completely refutes the loose interpretation placed upon it by petitioner.

These tests were not mere *ex parte* tests, but followed formal notice to petitioner and its numerous counsel as to time, place and purpose and inviting them to attend. It was a public demonstration of a thoroughly practical machine, in a practical way, under practical working conditions. The fact that petitioner's representatives did not choose to attend, grants them no license to misrepresent those tests nor to impugn the motives of the engineers and experts who conducted the tests, and whose testimony concerning the tests was heard and received by the trial Court. Their testimony was given full weight and is unimpeachable. (*Adamson v. Gilliland*, 242 U. S. 350.)

III.

The dangerous fallacies of petitioner's reasoning are further shown by the following statement on ill-fated page 17 of petitioner's reply brief:

> "(d) The Smith patent calls for a mixture which has three-fifths the bulk of solid materials added to it in water. This makes the mixture three-eighths water or 37½%. This is three times the normal amount of water, which is usually about 12% (one gallon to one cubic foot) accord-

> ing to common knowledge and all of the authorities, including Department of Agriculture, Good Roads Section. 300% of the normal amount of water will make nothing but a thin soup of the sand and cement, will entirely separate this soup from the mass of stone, and will destroy the concrete mixture."

The first two sentences state the facts correctly; but when petitioner's counsel speaks dehors the record they fall into serious error.

It is not true (even if it were material to the issues) that the Smith's mix calls for "three times the normal amount of water * * * according to common knowledge and all of the authorities including Department of Agriculture, Land Roads Section."

Inasmuch as petitioner has gone outside the record to mention an alleged authority (they cite no publication or bulletin) we are justified in asking the Court to take judicial notice of a recognized leading authority on the subject: "Basic Principles of Concrete Mixing," by Franklin R. McMillan, Director of Research, Portland Cement Association, 1929. We take the liberty of appending a photostat of page 76 from that work. As shown by that table, the quantity of water varies from 5½ gallons to 8¼ gallons per sack (1 cubic foot) of cement, which is equivalent, in the case of 8¼ gallons per cubic foot of cement, to **2½ gallons of water per cubic foot of mixed concrete**—not 1 gallon per cubic foot, as stated by petitioner.

Answering them in another way.

The Smith formula (see our opening brief, p. 120) calls for:

1 part cement
1 part sand
3 parts rock,

plus a quantity of water equal to 3/5 of the entire mass of commingled materials.

Thus assume with Smith, we mix a batch of:

100 lbs. cement
100 lbs. sand
300 lbs. rock,

or a total of 500 lbs. of commingled material or approximately 3.2 cubic feet.*

The 3.2 cubic feet of mixed materials require by the Smith formula, 3/5 of the volume of water; or 1.92 cubic feet of water, equivalent to 0.60 cubic feet of water per cubic foot of concrete; or 37½ lbs., or 14.3 gals. per cubic foot of cement.

This conforms to authority as seen by reference to the noted book of Prof. Baker, "A Treatise on Masonry Construction." 1908, page 112-1, where it is said:

> "156. The amount of water required to produce any particular plasticity varies so greatly with the proportion of ingredients, the kind and fineness of the cement, the dampness of the sand, the kind of aggregate, etc., that it is scarcely possible to give any valuable general data. The water varies from 10 to 40 pounds per cubic foot of concrete."

Not only is Smith's machine practical but his concrete mixture is eminently practical and up to date.

*The cement and sand fill the voids between the broken rocks so that the mass is denser and more compact than would be the case if there were 500 lbs. of rocks, the rock running about 33⅓ voids.

IV.

Petitioner at page 17 of said brief, in stressing the "velocity nozzle," misinterprets Smith:

> "(a) The Smith apparatus has no velocity nozzle," * * *

They overlook the important fact that in the Smith machine the air inlet on top of the apparatus is in vertical axial line with the vertical discharge outlet for the concrete. The consequence is that when the air is turned on, as was shown at the tests, the high pressure air under high velocity bores through the cement and does just what petitioner is claiming for the McMichael "velocity nozzle." McMichael had to show in his patent both air pressure on top and at the outlet, because of the U-trap 24 in the discharge pipe. McMichael never built a machine with such a U-trap because it would never have worked. (R. 422.)

Smith's single air jet performs both functions: i. e. Application of pressure on top of the concrete and acting locally to impel at high velocity the concrete through the outlet.

The concrete used in general practice with the Hackley gun is a wet concrete of sufficient fluid consistency that it can flow by gravity. (R. 424.)

Hackley uses no air on top of his concrete because if he did it would **blow out ahead of the charge,** as is readily seen by a mere inspection of the colored chart opposite page 3 of our opening brief.

Dated, San Francisco, California,
October 11, 1930.

Respectfully submitted,
CHAS. E. TOWNSEND,
Attorney for Defendant-Respondent.

TABLE VII.—RECOMMENDED WATER-CEMENT RATIOS FOR CONCRETE TO MEET DIFFERENT DEGREES OF EXPOSURE

These requirements are predicated on the use of concrete mixtures in which the cement meets the present standard specifications of the A. S. T. M. and to which an early curing is given that will be equivalent to that obtained when protected from the loss of moisture for at least 10 days at a temperature of 70 deg. F. Also that the concrete is of such consistency and is so placed that the space between the aggregate particles is completely filled with cement paste of the given water ratio.

Exposure \ Class of structure	Water-cement ratio, U. S. gal. per sack[1]		
	Reinforced piles, thin walls, light structural members.	Reinforced reservoirs, water tanks, pressure pipes, sewers, canal linings, dams of thin sections.	Heavy walls, piers, foundations, dams of heavy sections.
Extreme:			
1. In severe climates like in northern U. S., exposure to alternate wetting and drying, freezing and thawing, as at the water line in hydraulic structures.	5½	5½	6
2. Exposure to sea and strong sulphate waters in both severe and moderate climates.			
Severe:			
3. In severe climates like in northern U. S., exposure to rain and snow, and freezing and thawing, but not continuously in contact with water.	6	6	6¾
4. In moderate climates like southern U. S., exposure to alternate wetting and drying, as at water line in hydraulic structures.			
Moderate:			
5. In climates like southern U. S., exposure to ordinary weather, but not continuously in contact with water.	6¾	6	7½
6. Concrete completely submerged, but protected from freezing.			
Protected:			
7. Ordinary inclosed structural members; concrete below the ground not subject to action of corrosive groundwaters or freezing and thawing.	7½	6	8¼

[1] Free water or moisture carried by the aggregate must be included as part of the mixing

SUPREME COURT OF THE UNITED STATES.

Nos. 3 and 4.—October Term, 1930.

Powers-Kennedy Contracting Corporation, and Anthony G. Fleck, Petitioners, *vs.* Concrete Mixing and Conveying Company.	On Writ of Certiorari to the United States Circuit Court of Appeals for the Second Circuit.
Concrete Mixing and Conveying Company, Petitioner, *vs.* R. C. Storrie & Company.	On Writ of Certiorari to the United States Circuit Court of Appeals for the Ninth Circuit.

[December 15, 1930.]

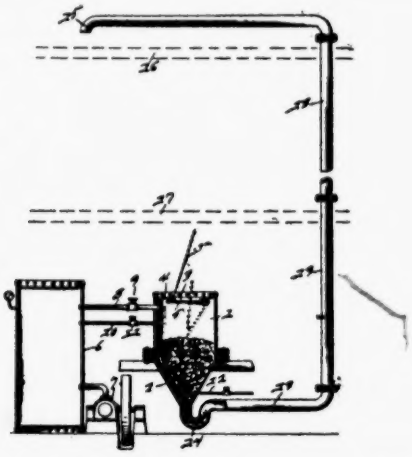
Mr. Justice Roberts delivered the opinion of the Court.

These cases involve the validity, and the alleged infringement, of letters patent No. 1,127,660, of date February 9, 1915, issued to John H. McMichael, and assigned to Concrete Mixing and Conveying Company.

The Court of Appeals of the Second Circuit, in *Concrete Mixing and Conveying Company* v. *Ulen Contracting Corporation* (12 F. (2d) 929), held the patent valid and infringed. In No. 3 the District Court followed that decision. Its decree was affirmed by the Circuit Court of Appeals of the Second Circuit (27 F. (2d) 668).

Meantime, in No. 4, the District Court for the Western District of Washington held the patent void for want of novelty and invention (23 F. (2d) 131). Subsequent to the decision of the Court of Appeals of the Second Circuit, that of the Ninth Circuit affirmed the Washington District Court (27 F. (2d) 838). In view of the conflict thus disclosed this court granted certiorari in both cases, "the two cases to be heard as one". (278 U. S. 595.)

The patent is for certain new and useful improvements in methods of and apparatus for transporting and treating concrete. The accompanying drawing illustrates the apparatus.



It consists of a chamber 1, for the reception of the material, the lower portion being hopperlike in form, as indicated at 2. The cover 4 is provided with an opening 3, in which there is a door 5. A chain or rope 3a is adapted to be used in partly or entirely closing the door. Air pressure in the chamber also acts to hold this door in closed position. A pressure tank 6 holds compressed air supplied by an air compressor 7, and has a connection 8 leading the air under pressure from the tank to the chamber 1; the air inlet is preferably near the top. An air pipe 10 controlled by a valve 11 also leads into the chamber, the delivery end of this pipe being at or near the discharge or lower end of the hopper.

The apparatus includes a valve-controlled water supply pipe 12 adapted to deliver water at the lower end of the hopper so as to make the mass more easily movable when desired, and also a crook or U-shaped bend 14 in the discharge duct 13.

The operation as described in the application for patent consists in depositing material in the chamber, closing the door, turning the air from the reservoir through the pipe 8 into the upper portion of the chamber, thus insuring the immediate firm closure of the door and forcing the material in the hopper downward, it being

carried along through the conveying tube 13 until it is finally discharged at 15.

In the application as originally filed it was stated that owing to the provision of the U-shaped bend in the conveying tube the material, immediately after leaving the hopper, will be more or less tightly packed; and it is added that "to loosen the material at the lower end of the hopper should the same become packed, I provide the additional air pipe adapted to discharge air through the material."

It should also be remarked that in the original application the invention was described as useful improvements in apparatus for "elevating and transporting granular and plastic building material, such as sand, plaster, mortar and concrete".

The application was filed in the Patent Office on January 14, 1907. Its prosecution was most dilatory. Claims made were repeatedly disallowed, and at one time it lapsed and had to be renewed. Radical changes were made in the statement of invention, and radically new claims were made in 1911 and expanded in 1913. The applicant eliminated from the scope of his invention the transportation of granular and plastic material generally, and limited it to the transportation and treatment of concrete; and the patent as issued is so limited. While his original assertion that the compressed air admitted to the chamber behind the mass was the propelling force was retained, statements were added and claims were made, ascribing to the air discharged by pipe 10 new action and effect, namely, that it operated to "engage submasses" or to "impinge upon successive portions" of the mass of concrete moving through the hopper and discharge duct, and to aid or assist in their movement in the duct, as well as assisting in mixing and mingling the elements of the concrete in the duct, so as to make a more perfect mixture.

The device alleged in No. 3 to infringe consists of a container, in all material respects like that of the patent, with a discharge duct. It, however, employs no upper air behind the mass in the container. It has no U-bend in the duct at the outlet of the hopper, nor does it have a pipe terminating in the hopper near the outlet. On the contrary it has a pipe which discharges compressed air into the duct at the right-angle elbow therein immediately below the outlet of the hopper, thus forcing air into and along the duct in the direction in which the material is to move.

The device alleged in No. 4 to constitute an infringement is made under the Hackley patent, No. 1,619,297, of date March 1, 1927. It consists of a cylindrical container set horizontally instead of vertically. The door for admission of the concrete is on the top of the apparatus, a funnel-shaped exit is located at one end, the bottom of said funnel being continuous with the lowest portion of the cylinder wall, and the upper portion of the funnel joining a part of the end of the cylinder. Four pipes are led into the cylinder, the first of which discharges into the funnel and the other three at various distances to the rear of the first, along the bottom of the cylinder and in the direction of the funnel. Its method of operation is that after the cylinder is filled with concrete and the door closed, compressed air is discharged through the pipes in order, first through the one which ends in the funnel, and successively through the others to the rearward until the last one is opened. There is no provision for admission of compressed air on top of or behind the mass, as in the McMichael apparatus. Nor is there any trap or U-bend in the delivery duct, which is continuous with the mouth of the funnel and runs in a direct line therefrom.

If the patent in question were valid as disclosing novelty and invention we should be bound to analyse the differences of structure and operation above indicated to determine the question of infringement. We have concluded, however, that it does not disclose invention, and that we need not, therefore, narrowly examine the devices and their operation to ascertain whether there is infringement.

The idea of moving fluids and solids through a pipe by air pressure or other fluid pressure is old, and was well known at the time of the alleged invention. Both granular and plastic materials had been so moved by devices quite similar to that of the patent. These covered a wide range, from lift-pumps for sand and sulphur, to apparatus for transporting muck, spoil, grout, and concrete.

It is averred, however, that neither an apparatus nor a method such as that devised by McMichael had theretofore been applied to the transportation of concrete. If this be true its truth must lie in the fact that McMichael either discovered an improvement in

apparatus or an improvement in method over the prior art. We think that he did not do so; and we shall call attention to some of the facts which lead us to this conclusion.

The provision of a hopper-shaped bottom for the cylinder, thus causing the mass of material to converge towards the delivery duct, is specified by McMichael as an element in his invention. It was old in the art. Warren had employed it in a sand-blast apparatus patented April 2, 1901, No. 671,303. Goldie had used it in a cementing apparatus patented August 26, 1902, No. 707,840. Canniff had shown it in a pneumatic grout-mixing and discharging apparatus patented December 10, 1907, No. 873,345. Nor is there any merit in the claim of invention in making the funnel-shaped discharge end of the cylinder connect with the delivery duct smoothly and without offsets.

The next element to be considered is the introduction of air behind the mass in order to propel it into the discharge duct. This was old in the art. Smith had provided for the employment of such compressed air in an enclosed chamber above the mass in his patent for machinery for laying concrete pavement, of January 2, 1872, No. 122,498. Duckham had employed it in an apparatus for discharging muck or spoil (English patent No. 4400, December 18, 1875). Canniff had used it in his patent above referred to, as had McIlvrid in a grout mixing and discharging machine, patent No. 958,421, Farnham in a sand-blast apparatus patented December 22, 1903, No. 747,396, and Warren in a similar apparatus in his patent above referred to. Other devices might be cited.

Much reliance is placed upon the pipe 10, with its end or nozzle in the chamber near the outlet. In his original application McMichael described its operation somewhat as follows:

He called attention to the U-bend or trap 14 just below the outlet of the chamber. He stated that this would cause the mass to pack tightly as it was driven down by the upper air pressure, and claimed that the blast of air from the pipe 10 would tend to prevent clogging or arching at this point, thus enabling the material to move more freely into the discharge duct. If this be a claim to novelty or invention it is clearly anticipated by the Duckham English patent above cited. In the device covered by that patent air is admitted to an airtight chamber above the mass of muck or spoil

to be moved, thus driving it, as in McMichael's, to the outlet. One or more nozzles for the delivery of similar compressed air are placed near the outlet of the chamber, so that the air from them will mingle with and stir up the mass. It is added that a nozzle may also be placed in the discharge pipe for the same purpose, and attention is called to the usefulness of larger nozzles where the material to be moved is clay or similar matter which is likely to harden and form a resistant mass near the outlet of the chamber.

In the amendment to his specifications McMichael, while still claiming the function of pipe 10 to be to loosen material at the lower end of the hopper and to assist movement of the mass, added an additional claim, saying that it "serves the double function of preventing choking in the entrance to the delivery pipe and of supplying air under pressure in sharp jets directly to the delivery pipe itself". He says that he has found that this supplemental air pipe 10 is very effective in aiding the passage of the material into and through the conveyor pipe. He claims that this second air pipe "gives to the material the velocity which is needed to carry it to the remote point of delivery." He explains that the upper pipe supplies air which acts by pressure, and the lower pipe supplies air which acts by velocity. Again he states that the air from this pipe "may force itself into the body of the mass", and adds that it "engages with the submasses to push them along". He phrases the matter differently by claiming that this air acts upon submasses successively, and claims as a result "the thorough commingling of the ingredients" with greater rapidity. At considerable length he then elaborates upon the value of the air discharged by this pipe as a mixing agent.

These specifications and the claims based upon them are particularly important in view of the theory now brought forward—that jets of air from the pipe 10 cut off so called "slugs" or portions of the concrete and propel them individually like pistons through the delivery pipe. An examination of the specifications and claims discloses no claim to this slug or pistonlike action of the air so delivered. Any such action is quite inconsistent with the claim that the air from the pipe mingles with the mass and causes additional mixing in the delivery pipe making the latter a sort of mixing chamber. Unless the slug theory is disclosed in the patent

and is a correct theory of operation it would seem that there is no invention in the use of the pipe 10.

It is conceded that in the commercial form of the patented apparatus the U-bend is entirely discarded. It cannot therefore have any useful function and cannot be the subject of invention. It is further conceded that in the said commercial form pipe 10 is not brought into the chamber and does not terminate in the hopperlike exit. On the contrary, the pipe is led into the elbow in the conduit directly below the hopper and discharges in the direction in which the material is to move. If the function of the pipe is that of a booster or velocity nozzle (as is undoubtedly, amongst other things, claimed in the patent), its use is not invention unless the application of it to concrete is novel and constitutes invention. The use of such nozzles in the conveying of material by compressed air is old in the art. Many of the patents cited and in evidence indicate this, and apart from them it is and must be conceded that such use was not uncommon at the time of McMichael's application.

Thomas Leake applied for a patent for an apparatus and method for mixing and transporting concrete, October 7, 1907. In this application he showed two nozzles similar to the pipe 10, discharging into the hopper of his closed chamber. The District Court and the Circuit Court of Appeals found in No. 4 that this invention in fact antedated McMichael's and we are not prepared to say that the testimony and corroborating documents did not justify this finding. There is considerable evidence tending to show that McMichael recognized the priority of Leake, and, as a result, purchased and took an assignment of Leake's patent while his own application was pending, in order to dispose of an interference declared by the Patent Office between them. It resulted that Leake did not offer evidence or press his claim to priority and that the McMichael patent was granted in 1915 and the Leake patent in 1917, and both of them are owned by the same company.

If there be any virtue in the so called slug theory, Leake has as clearly disclosed it as McMichael did, although neither of them make this method of operation clear in their specifications and claims.

It remains to discuss whether there is foundation for the claim that McMichael discovered new principles, namely, that concrete

could be moved by compressed air, or that if it could not be satisfactorily moved by pressure of compressed air or other fluid agent, it could so be moved by a nozzle which cut off portions of the mass and drove them through the delivery duct like pistons.

Methods and apparatus for moving concrete by compressed air had been previously invented. See Smith's patent, 122,498. The court below, in No. 3, indicated that this had not been found practicable. There is no support in the record for any such finding and against it stands the presumption of operability from its patenting. In No. 4 there was uncontradicted evidence that it would work, and that Canniff's grout machine (Patent 873,345) had been successfully used for concrete. Other apparatus closely approximating that of the patent in suit had been used for transporting grout. In his specifications McMichael's only suggestion as to why they were unfit for concrete is that the pipes and parts were not of sufficient size. But obviously a mere change in proportion would involve no more than mechanical skill and would not amount to invention.

We find no adequate ground for saying that McMichael's method operated in a novel and useful manner, by reason of the alleged function of the nozzle discharging into the moving mass, cutting off therefrom slugs or pistons of concrete and driving them forward individually.

The slug theory, so-called, seems to have been advanced for the first time in the *Ulen* case; and was there credited and relied upon to sustain the patent. In No. 3 the District Court thought it probable, but the Court of Appeals held the patent valid irrespective of the correctness of the theory.

In No. 4 the District Court found it incorrect and untenable. This coincides with our own view. The top pressure behind the mass and that coming through the pipe 10 is the same. There is no mechanism to produce sharp spurts or jets of air out of the end of pipe 10. That air, as the patent specifications in certain paragraphs suggest, mingles with the mass of concrete as it comes down through the hopper. It does not cut off masses and drive them forward like pistons, but acts merely by velocity. The evidence is persuasive that the concrete issues from the end of the discharge pipe in a stream or solid flow and not in surges of lumps. It is

proved that it freely passes ninety-degree bends in the pipe. In short there is neither theoretical nor practical demonstration of any such phenomenon as the owner of the patent asserts.

And, even if the mode of operation is as claimed, it is to be remembered that Leake in his application of October 7, 1907 uses the same words to describe the operation of his nozzles as we find McMichael subsequently inserted in his specifications and claims. When this application came into interference with McMichael's, he, of course, became familiar with Leake's claims. It is significant that he then amended his claims, almost in the very words of Leake. This of itself destroys the patent. *Railway Co.* v. *Sayles*, 97 U. S. 554; *General Electric Co.* v. *Sangamo Electric Co.*, 174 Fed. 246; *Lopulco Systems Inc.* v. *Bonnot Co.*, 24 Fed. (2d) 510.

For these reasons we find that the patent is invalid. It consists of a combination of elements all of which were old in the art. Its application to the transportation of concrete did not involve invention. Neither the combination of old elements or devices accomplishing no more than an aggregate of old results (*Hailes* v. *Van Wormer*, 20 Wall. 353; *Specialty Co.* v. *Fenton*, 174 U. S. 492; *Grinnell* v. *Johnson*, 247 U. S. 426) nor the use of an old apparatus or appliance for a new purpose (*Roberts* v. *Ryer*, 91 U. S. 150) is invention.

When, in addition, we find that similar combinations had been used for the transportation of granular material, muck and spoil and grout, and that combinations lacking one or another of the old elements of McMichael's had been used to transport concrete, what was said in *Concrete Appliances Co.* v. *Gomery*, 269 U. S. 177 applies with equal force to these cases:

"The several elements in the petitioners' claims which we have enumerated embrace familiar devices long in common use, separately or in smaller groups, both in this and in kindred mechanical arts. It is not argued that there is any novelty in such units or groups; and the only serious question presented is whether, in combination in the apparatus described, they constitute an invention."

This court called attention to the fact that the principle of conveying and distributing a mobile substance by gravity had been exemplified in various methods for centuries, and that long prior to the patent there in suit the principle had been applied to vari-

ous substances such as grain, coal, crushed stone, sand, and iron ore, and said:

"The observations of common experience in the mechanical arts would lead one to expect that once the feasibility of using 'wet' concrete in building operations was established, the mechanical skill of those familiar with engineering and building problems would seek to make use of known methods and appliances for the convenient handling of this new building material."

Here it appears that the use of compressed air for conveyance of granular and plastic materials had long been known and practised; so that the cited case is clear authority against invention in the instant cases.

The decree in No. 3 is reversed and the cause remanded with instructions to dismiss the bill of complaint. The decree in No. 4 is affirmed.

A true copy.

Test:

Clerk, Supreme Court, U. S.